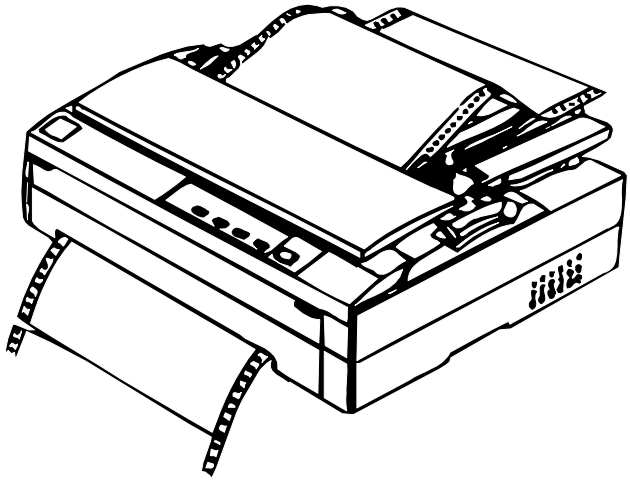
EPSON®

Service Manual

EPSON®

FX-880/FX-1180



Epson America, Inc.

TM-FX88/1180

EPSON
FX-880/FX-1180

Service Manual

Revision	Date
1st Release	August 1998

Table of Contents

1. Product Description 1-1

2. Operating Principles 2-1

3. Disassembly and Assembly 3-1

4. Adjustments 4-1

5. Troubleshooting 5-1

6. Maintenance 6-1

7. Appendix A-1

Preface

The EPSON FX-880 and EPSON FX-1180 are identical products, except for their width. To permit printing on wider paper, the FX-1180 has a wider body than the FX-880, but is the same as the FX-880 in all other respects. Unless noted otherwise, all information and instructions in this manual can be used to service either printer.

FCC COMPLIANCE STATEMENT
FOR AMERICAN USERS

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio and television reception. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio and television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

WARNING

The connection of a non-shielded equipment interface cable to this equipment will invalidate the FCC Certification of this device and may cause interference levels that exceed the limits established by the FCC for this equipment. It is the responsibility of the user to obtain and use a shielded equipment interface cable with this device. If this equipment has more than one interface connector, do not leave cables connected to unused interfaces.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the printer.

FOR CANADIAN USERS

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le materiel brouilleur du Canada.

COPYRIGHT NOTICE

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the written permission of Epson America, Inc. No patent liability is assumed with respect to use of the information contained herein. Neither is any liability assumed for damages resulting from the use of the information contained herein. While every precaution has been taken in the preparation of this book, Epson America, Inc., assumes no responsibility for errors and omissions.

Neither Epson America, Inc., nor its affiliates shall be liable to the purchaser of this product or third parties for damages, losses, costs, or expenses incurred by purchaser or third parties as a result of: accident, misuse, or abuse of this product or unauthorized modifications, repairs, or alterations to this product.

Epson America, Inc., shall not be liable against any damages or problems arising from the use of any options or any consumable products other than those designated as Original EPSON Products or EPSON-Approved Products by Seiko Epson Corporation.

TRADEMARKS

EPSON® and ESC/P® are registered trademarks and ESC/P 2™, EPSON FX-880™, and EPSON FX-1180™ are trademarks of Seiko Epson Corporation. Epson Connection is a service mark of Epson America, Inc.

General Notice: Other product names used herein are for identification purposes only and may be trademarks of their respective companies. EPSON disclaims any and all rights in those marks.

Copyright © 1998 Epson America, Inc.
20770 Madrona Avenue
Torrance, CA 90509-2842

PRECAUTIONS

Precautionary notations throughout the text are categorized relative to:

1. personal injury.
2. damage to equipment.

WARNING

Signals a precaution which, if ignored, could result in serious or fatal personal injury. Great caution should be exercised in performing procedures preceded by a WARNING heading.

CAUTION

Signals a precaution which, if ignored, could result in damage to equipment.

Always observe the precautionary measures itemized below when performing repair/maintenance procedures.

WARNING

1. Always disconnect the product from both the power source and host computer before performing any maintenance or repair procedure.
2. No work should be performed on the unit by persons unfamiliar with basic safety measures dictated for all electronics technicians in their line of work.
3. In performing testing described in this manual, do not connect the unit to a power source until instructed to do so. When the power supply cable must be connected, use extreme caution in working on the power supply and other electronic components.

CAUTION

1. Repairs on EPSON products should be performed only by an EPSON-certified repair technician.
2. Make certain that the source voltage is the same as the rated voltage listed on the serial number/rating plate. If the EPSON product has a primary AC rating different from the available power source, do not connect it to the power source.
3. Always verify that the EPSON product has been disconnected from the power source before removing or replacing printed circuit boards and/or individual chips.
4. To protect sensitive µP chip and circuitry, use static discharge equipment, such as anti-static wrist straps, when accessing internal components.
5. Replace malfunctioning components only with those components recommended by the manufacturer; introduction of second-source ICs or other nonapproved components may damage the product and void any applicable EPSON warranty.

1. Product Description

Features 1-1

Accessories 1-3

Hardware Specifications 1-4
- Printing Method 1-4
- Printing Specifications 1-4
- Paper Handling Specifications 1-5
- Paper Specifications 1-7
  - Cut Sheets 1-7
  - Envelopes 1-8
  - Continuous Paper 1-8
  - Roll paper 1-10
- Ribbon Cartridge 1-10
- Input data buffer 1-10
- Electrical Specifications 1-11
- Reliability 1-12
- Environmental Requirements 1-12
- Safety Approvals 1-13
- CE Marking 1-13
- Acoustic Noise 1-13

Firmware Specifications 1-14
- Control Codes and Fonts 1-14
- Interface Specifications 1-15
  - Parallel Interface (Forward Channel) 1-15
  - Parallel Interface (Reverse Channel) 1-17
  - Interfaces 1-18
  - Interface Selection 1-19
- Preventing Data Transfer Timeout in the Host 1-19

Control Panel Operation 1-20
- Control Panel 1-20
- Overview of Functions 1-20
  - Operation in Normal Mode 1-20
  - Operation at Power-On 1-21
  - Operation in the Default Setting Mode 1-21
- Details of Selected Functions 1-22
  - Micro-Adjust Function 1-22
  - Tear-off Function 1-22
  - Changing the Default Settings 1-23
  - Bidirectional Adjustment Function 1-25

Printer States and Error Reporting 1-27
- Initialization 1-27
- Error Conditions 1-27
- Conditions Indicated by the LEDs and Beeper 1-28

Main Components 1-29

Features

The EPSON FX-880 and FX-1180 are small-footprint, 9-pin serial impact dot matrix printers. Except for their width, the two printers are exactly the same. The FX-1180 has a wider carriage unit and paper handling mechanism, and prints on wider paper than the FX-880.

The main features of the FX-880 and FX-1180 are:

- **Print Speed**

High speed draft	410 cps at 10 cpi (max. 455 cps at 12 cpi)
Draft	310 cps at 10 cpi
NLQ	77 cps at 10 cpi

- **Feeding Method**

Friction feed	(front, rear)
Push tractor feed	(front, rear)
Push and pull tractor feed	(front, rear)*
Pull tractor feed	(front, rear, bottom)
Cut-sheet feeder	(CSF, optional)

- **Feeder**

Front push tractor, rear push tractor,
CSF bin1/bin2 (optional), roll paper holder (optional)
pull tractor (optional)

- **Paper/Media**

Single sheet, continuous, and multi-part paper, envelopes, card stock, labels, and roll paper**

- **Printable columns**

FX-1180: 136 columns (at 10 cpi)
FX-880: 80 columns (at 10 cpi)

- **Built-in fonts**

Bitmap fonts:

EPSON Draft	10, 12, 15 cpi
EPSON Roman	10, 12, 15 cpi, proportional
EPSON Sans Serif	10, 12, 15 cpi, proportional

Barcode fonts:

EAN-13, EAN-8, Interleaved 2 of 5, UPC-A, UPC-E,
Code 39, Code 128, POSTNET

Notes: **Additional tractor is required.*
***Roll paper is not available on all models, and is not available in the U.S.*

- **Character tables** — Standard version: 11 tables; NLSP version: 19 tables
- **Character sets** — 12 international character sets and one legal character set
- **Input buffer** — 32KB or 0KB (selectable in the default-setting mode or using the EPSON Remote! utility with Windows 95)
- **Acoustic noise** — Approximately 55 dB(A), ISO 7779 pattern
- **Reliability**

Total print volume	6.5 million lines, except printhead
MTBF	4000 power-on hours (POH) at 25% Duty-Cycle
Printhead life	200 million strokes per wire
Ribbon life	3 million characters (in Draft mode at 10 cpi with approximately 14 dots per character)

- **Interfaces** — One standard bidirectional, 8-bit, parallel interface with IEEE-1284 nibble mode support, and one optional Type B level 2 interface slot
- **Control codes** — ESC/P and IBM 2380 Plus (for the FX-880) or 2381 Plus (for the FX-1180) character emulation
- **Copy capability** — 1 original + 5 copies

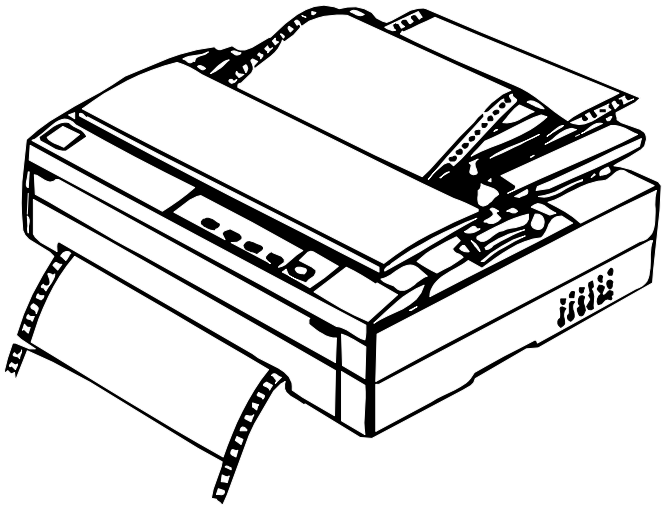


Figure 1-1. Exterior of FX-880 (FX-1180 similar but wider)

Accessories

Table 1-1. Items Included with the Printer

Enclosed item	Quantity
User's guide	1
Driver diskette	1
Ribbon cartridge	1

1-2. Consumables and Optional Units

Item	Part Number	
	FX-1180	FX-880
Ribbon cartridge	8755	8750
High capacity cut sheet feeder (bin1)	C806401	C806381
Second bin cut sheet feeder (bin2)	C806391	C806371
Push/pull tractor unit	1038519	C800201
Roll paper holder	8310	8310
Front paper guide	C814031	C814021
Front sheet guide	C814011	C814001
0KB type-B Serial interface card	C823051	C823051
32KB type-B intelligent serial I/F card	C823071	C823071
Coax type-B I/F card	C823141	C823141
Twinax type-B I/F card	C823151	C823151
Multi-protocol Ethernet type-B I/F card	C823572	C823572
Bi-directional parallel type-B I/F card	C823452	C823452
LocalTalk I/F card	C823121	C823121

Hardware Specifications

This section describes the hardware specifications of the FX-880 and FX-1180.

Printing Method

- **Printing method** — Impact dot matrix
- **Number of pins** — 9 pins
- **Pin arrangement** — 9 × 1
- **Pin diameter** — 0.0114 inch (0.29 mm)
- **Print color** — Black
- **Print direction** — Bidirectional logic seeking when printing text and graphics. Unidirectional text or graphics printing can be selected with software commands.

Printing Specifications

- **Copy capability** — 1 original + 5 copies

Table 1-3. Print Speed and Printable Columns

Printing Mode	Character Pitch	Printable Columns		Print Speed (cps) at 10 cpi	
		FX-1180	FX-880	Normal	Copy
High-speed draft	10 cpi	136	80	410	345
Draft	10 cpi	136	80	310	260
NLQ	10 cpi	136	80	78	65

***Notes**:*

1. *Both printers can print a maximum of 455 cps at a pitch of 12 cpi.*
2. *If the power supply voltage drops below the lower limit, the printer stops until the voltage returns to the normal range. The printer then resumes printing, but more slowly than before.*
3. *If the printhead temperature rises above the upper limit, the printer stops until the printhead cools down to the normal temperature. The printer then resumes printing, but more slowly than before.*
4. *When the platen gap lever is set at position 2 or higher, the printer goes into copy mode. In copy mode, the print speed slows to prevent the dot wires from getting stuck in the thicker paper as the printhead travels across the page. Note that "copy mode," as used in this manual, does not refer to overstrike, a function not supported by the FX-880 or FX-1180 printer.*

Table 1-4. Print Resolution

Print Mode	Horizontal density	Vertical density	Adjacent dot printed?
High-speed draft	90 dpi	72 dpi	No
Draft	120 dpi	72 dpi	No
NLQ	240 dpi	144 dpi	No
Bit image	60, 72, 80, 90 or 120 dpi	72 dpi	Yes
	120 or 240 dpi	72 dpi	No

❑ **Control codes** ESC/P and IBM 2380/2381 Plus character emulation.

Paper Handling Specifications

❑ **Paper feed methods**

Friction feed (front, rear)
Push tractor (front, rear)
Pull tractor (front, rear, bottom)
Push and pull tractor (additional tractor required)
CSF bin1/bin2 (optional)
Roll paper holder (optional)

❑ **Paper path**

Manual Insertion	Front in, front out
CSF	Rear in, front out
Tractor	Rear, front, or bottom in, front out

❑ **Paper capacity**

Single-bin cut-sheet feeder:
up to 50 sheets of 22 lb (80 g/m^2) paper

Note:
The total thickness of the paper stack can be up to 0.20 inches (5 mm).

High-capacity cut-sheet feeder:
up to 150 sheets of 22 lb (82 g/m^2) paper
up to 25 plain or bond envelopes
up to 30 airmail envelopes

Note:
The total thickness of the paper stack can be up to 0.59 inches (15 mm).

❑ **Line spacing** 1/6 inch or programmable in increments of 1/216 inch

❑ **Feed speed**

Table 1-5. Feed Speed

Mode	Type of Feed	Speed
Normal	1/6 inch	62 ms/line
	Continuous	5.0 inches/sec (0.127 m/sec)
Copy	1/6 inch	83 ms/line
	Continuous	3.1 inches/sec (0.078 m/sec)

❑ **Release lever** Set the paper release lever using the following table.

Table 1-6. Paper Release Lever Position

Lever Position	Paper Entrance	Paper Types
Single-sheet position	Front insertion	Cut sheet (single sheet and multi-part) Card stock
	CSF bin1	Cut sheet (single sheet and multi-part) Envelopes, card stock
	CSF bin2	Cut sheet (single sheet)
	From rear using roll paper holder	Roll paper
Front push tractor position	From front using front push tractor, or using front push and pull tractors in combination	Continuous paper (single sheet and multi-part)
Rear push tractor position	From rear using rear push tractor, or rear push and pull tractors in combination	Continuous paper (single sheet and multi-part)
Pull tractor position	From front, rear, or bottom using top-mounted pull tractor	Continuous paper (single sheet and multi-part)

❑ **Paper thickness lever** Set the paper thickness lever, as indicated in the following table.

Table 1-7. Paper Thickness Lever Position

Lever Position	Paper Thickness (inches)		Paper Thickness (mm)	
	Minimum	Maximum	Minimum	Maximum
0	0.0024	0.0047	0.065	0.12
1	0.0047	0.0075	0.12	0.19
2	0.0075	0.0102	0.19	0.26
3	0.0102	0.0126	0.26	0.32
4	0.0126	0.0142	0.32	0.36
5	0.0142	0.0157	0.36	0.40
6	0.0157	0.0205	0.40	0.52

Paper Specifications

This section describes the types of paper that can be used with this printer.

Cut Sheets

Table 1-8. Specifications for Cut Sheets (as single sheets of paper)

Width	FX-1180: 5.8 to 16.5 inches (148 to 420 mm) FX-880: 5.8 to 10.1 inches (148 to 257 mm)
Length	Front entry: 7.2 to 14.3 inches (182 to 364 mm) Rear entry: 3.6 to 14.3 inches (92 to 364 mm)
Thickness	0.0025 to 0.0055 inches (0.065 to 0.14 mm)
Weight	14 to 24 lb (52 to 90 g/m^2)
Quality	Plain or recycled paper; neither curled, folded, nor crumpled

Note:

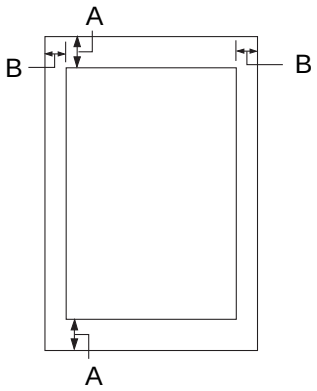
Printing on recycled paper or card stock is available only at normal temperatures and humidity.

Table 1-9. Specifications for Cut Sheets (as multi-part forms)

Insertion	Front or rear entry
Width	FX-1180: 5.8 to 16.5 inches (148 to 420 mm) FX-880: 5.8 to 10.1 inches (148 to 257 mm)
Length*	7.2 to 14.3 inches (182 to 364 mm)
Copies	1 original + 5 copies
Total thickness	0.0047 to 0.018 inches (0.12 to 0.46 mm)
Weight	12 to 15 lb (40 to 58 g/m^2)
Quality	Carbonless multi-part forms, neither curled, folded, nor crumpled
Joining	Apply glue in a straight line at the top or at one side of a form.

Notes:

1. ** Maximum length, including perforation area. Length excluding perforation area is 11.7".*
2. *Do not use CSF bin 2 when printing a multi-part form.*



A The minimum top and bottom margins are 0.17 inch (4.2 mm).

B The minimum left and right margins are 0.12 inch (3 mm).

The maximum printable width is 8 inches (203.2 mm) for the FX-880 and 13.6 inches (345.4 mm) for the FX-1180.

Figure 1-2. Margins for Cut Sheets

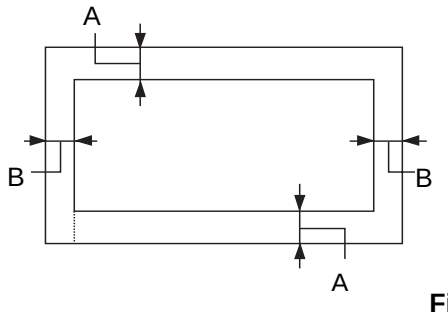
Envelopes

Table 1-10. Specifications for Envelopes

Envelope type	No.6	No.10
Width	6.5 inches (165 mm)	9.5 inches (241 mm)
Length	3.6 inches (92 mm)	4.1 inches (105 mm)
Insertion	Rear entry only	
Total thickness	0.0063 to 0.020 inches (0.16 to 0.52 mm) The variation in thickness in the print area, due to envelope construction, must be within 0.0098 inches (0.25 mm).	
Weight	12 to 24 lb (45 to 90 g/m^2)	
Quality	Airmail envelopes without glue on the flap, bond envelopes, and plain envelopes.	

Notes:

1. *Printing on envelopes should be done only at normal temperatures and humidity.*
2. *Do not use CSF bin 2 when printing on envelopes.*
3. *Insert the longer side of the envelope horizontally.*



A The minimum top and bottom margins are 0.17 inch (4.2 mm).

B The minimum left and right margins are 0.12 inch (3 mm).

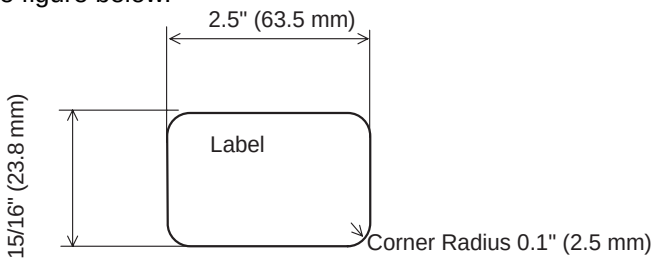
Figure 1-3. Margins for Envelopes

Continuous Paper

Table 1-11. Specifications for Continuous Paper (single sheet and multi-part)

Insertion	Front entry, rear entry, bottom entry
Width	FX-1180: 4 to 16 inches (101.6 to 406.4 mm) FX-880: 4 to 10 inches (101.6 to 254 mm)
Length	4 to 22 inches (101.6 to 558.8 mm)
Copies	1original + 5 copies
Total thickness	0.0025 to 0.018 inches (0.065 to 0.46 mm)
Weight	14 to 22 lb (52 to 82 g/m^2)
Weight (multi-part)	12 to 15 lb (40 to 58 g/m^2)
Quality	Plain paper, recycled paper, carbonless multi-part
Joining	Apply small dots of glue, or paper staple (crimp) both the right and left sides.

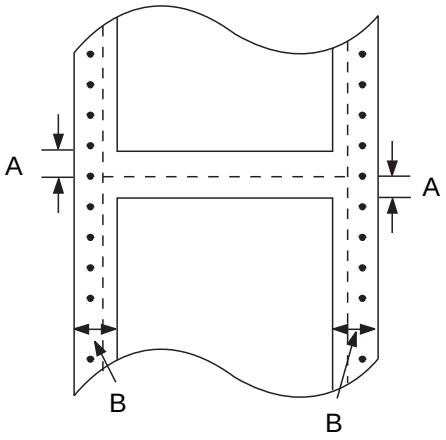
Table 1-12. Specifications for Continuous Form Labels

Insertion	Front (push or pull tractor, but preferably pull) or bottom (pull tractor)
Minimum label size	See the figure below:  **Figure 1-4. Label**
Backing sheet width	FX-1180: 4 to 16 inches (101.6 to 406.4 mm) FX-880: 4 to 10 inches (101.6 to 254.0 mm)
Backing sheet length	4 to 22 inches (101.6 to 558.8 mm)
Backing sheet thickness	0.0028 to 0.0035 inches (0.07 to 0.09 mm)
Total thickness	0.0063 to 0.0075 inches (0.16 to 0.19 mm)
Label weight	17 lb (68 g/m^2)
Quality	AVERY Continuous Form labels, AVERY Mini-Line labels, or labels of equal quality

Notes:

1. Printing on labels is available only at normal temperatures and humidity.

2. The base sheet for the labels must be continuous paper.



A The minimum top and bottom margins (above and below the perforation) are 0.17 inch (4.2 mm).

B The minimum left and right margins are 0.51 inch (13 mm).

The maximum printable width is 8 inches (203.2 mm) for the FX-880 and 13.6 inches (345.4 mm) for the FX-1180.

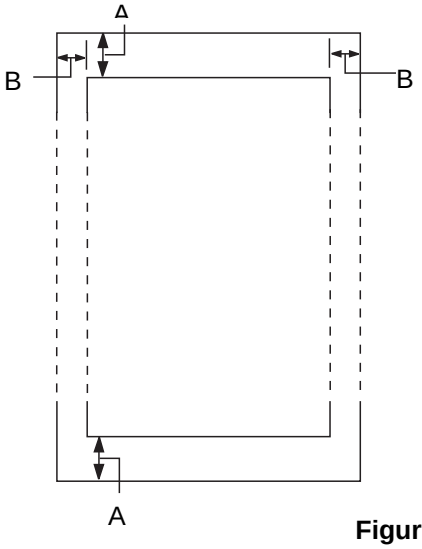
Figure 1-5. Margins for Continuous Paper

Roll paper

Table 1-13. Specifications for Roll Paper

Insertion	Rear entry
Maximum paper width	FX-1180: 16 inches (406.4 mm) FX-880: 8.5 inches (216 mm)
Thickness	0.0028 to 0.0035 inches (0.07 to 0.09 mm)
Weight	14 to 22 lb (52 to 82 g/m^2)
Quality	Plain paper; neither curled, folded, nor crumpled

Note:
Using roll paper requires an optional roll paper holder.



A The minimum top and bottom margins are 0.17 inch (4.2 mm).

B The minimum left and right margins are 0.12 inch (3 mm).

The maximum printable width is 8 inches (203.2 mm) for the FX-880 and 13.6 inches (345.4 mm) for the FX-1180.

Figure 1-6. Margins for Roll Paper

Ribbon Cartridge

Table 1-14. Statistics for the Ribbon

Item	Specifications
Type	Fabric
Color	Black
Ribbon life	3 million characters (in draft mode at 14 dots per character)

Input data buffer

- **0 Kb or 32 Kb**

Note:
The size of the input data buffer depends on the printer's default settings.

Electrical Specifications

Electrical specifications for the FX-880 and FX-1180 depend on both the model and the type of power supply it contains:

Table 1-15. Electrical Specifications for the 120 V Version

Item	Specification
Rated voltage	120 VAC
Input voltage range	103.5 to 132 VAC
Rated frequency range	50 to 60 Hz
Input frequency range	49.5 to 60.5 Hz
Rated current	0.7 A (maximum 1.6 A, depending on the character type)
Power consumption	FX-1180: Approximately 36 W (ISO/IEC 10561 letter pattern) FX-880: Approximately 34 W (ISO/IEC 10561 letter pattern) ENERGY STAR Compliant
Insulation resistance	10 MΩ minimum (between AC line and chassis)
Dielectric strength	1000 VAC rms 1 min or 1200 VAC rms 1 sec (between AC line and chassis)

Table 1-16. Electrical Specifications for the 230 V Version

Item	Specification
Rated voltage	220 to 240 VAC
Input voltage range	198 to 264 VAC
Rated frequency range	50 to 60 Hz
Input frequency range	49.5 to 60.5 Hz
Rated current	0.4 A (maximum 0.9 A, depending on the character type)
Power consumption	FX-1180: Approximately 36 W (ISO/IEC 10561 letter pattern) FX-880: Approximately 34 W (ISO/IEC 10561 letter pattern) ENERGY STAR Compliant
Insulation resistance	10 MΩ minimum (between AC line and chassis)
Dielectric strength	1000 VAC rms 1 min or 1200 VAC rms 1 sec (between AC line and chassis)

Table 1-17. Electrical Specifications for the UPS Version

Item	Specification
Rated voltage	100 to 120 VAC or 220 to 240 VAC
Input voltage range	90 to 132 VAC or 198 to 264 VAC
Rated frequency range	50 to 60 Hz
Input frequency range	49.5 to 60.5 Hz
Rated current	at 120 V: 0.8 A (maximum 2.0 A, depending on the character type) at 230 V: 0.5 A (maximum 1.0 A, depending on the character type)
Power consumption	FX-1180: Approximately 36 W (ISO/IEC 10561 letter pattern) FX-880: Approximately 34 W (ISO/IEC 10561 letter pattern) ENERGY STAR Compliant
Insulation resistance	10 MΩ minimum (between AC line and chassis)
Dielectric strength	1500 VAC rms 1 min (between AC line and chassis)

Reliability

Table 1-18. Reliability Statistics

Item	Specifications
Total print volume	6.5 million lines (except printhead)
MTBF	4000 power-on hours (POH)
Printhead life	200 million characters/wire

Environmental Requirements

The printer requires the following conditions while operating or in storage:

Table 1-19. Environmental Requirements

Item	Specifications
Temperature	41 to 95° F (5 to 35° C), operating [*1] 59 to 77° F (15 to 25° C), operating [*1, *2] -22 to 140° F(-30 to 60° C), storage
Relative Humidity	10 to 80%, operating [*1] 30 to 60%, operating [*1, *2] 0 to 85%, storage [*1]

Notes:

1. *Without condensation.*
2. *During printing on envelopes, card stock, labels, multi-part forms, roll paper, or recycled paper.*

Safety Approvals

The FX-880 and FX-1180 have met the following safety approvals:

Table 1-20. Safety Information

Version	Safety Standards	EMI
120 V	UL 1950 with D3, CSA C22.2 No. 950	FCC part 15 subpart B class B, CSA C108.8 class B
230 V	EN60950 (VDE, NEMKO)	EN55022 (CISPR pub. 22) class B, AS/NZS 3548 class B
UPS	UL 1950, CSA C22.2 No. 950	FCC part 15 subpart B class B, CSA C108.8 class B

CE Marking

The following table lists CE marking information for the 230 V version.

Table 1-21. CE Marking for the 230 V Version

Low Voltage Directive 73/23/EEC	EN60950
EMC Directive 89/336/EEC	EN55022 class B EN61000-3-2 EN61000-3-3 EN50082-1 IEC801-2 IEC801-3 IEC801-4

Acoustic Noise

- **Level** Approximately 55 dB (A) (ISO 7779 pattern)

Firmware Specifications

This section provides detailed information about firmware for the FX-880 and FX-1180.

Control Codes and Fonts

- **Control codes** — ESC/P 2 and IBM 2380/2381 Plus character emulation

- **Typefaces**

Bit map fonts

EPSON Draft	10 cpi, 12 cpi, 15 cpi
EPSON Roman	10 cpi, 12 cpi, 15 cpi, proportional
EPSON Sans Serif	10 cpi, 12 cpi, 15 cpi, proportional

Bar code fonts

EAN-13, EAN-8, Interleaved 2 of 5, UPC-A, UPC-E, Code 39, Code 128, and POSTNET

- **Character sets**

12 international character sets and one legal character set

- **Character tables**

Table 1-22. Character Tables

	Character Tables	Bitmap Fonts
Standard version	Italic PC437 (US Standard Europe) PC850 (Multilingual) PC860 (Portuguese) PC861 (Icelandic) PC863 (Canadian-French) PC865 (Norwegian) Abicomp BRASCII Roman 8 ISO Latin 1	EPSON Draft EPSON Roman EPSON Sans Serif

Interface Specifications

The FX-880 and FX-1180 provide a bidirectional 8-bit parallel interface and a Type-B optional interface slot as standard.

Parallel Interface (Forward Channel)

- **Transmission mode** 8 bit parallel, IEEE-1284 compatibility mode
- **Adaptable connector** 57-30360 (AMPHENOL) or equivalent
- **Synchronization** /STROBE pulse
- **Handshaking** BUSY and /ACKNLG signals
- **Signal level** TTL compatible (IEEE-1284 level 1 device)

Table 1-23. Pin Assignments for Forward Channel

Pin	Signal	Return GND Pin	In/Out	Functional Description
1	/STROBE	19	In	Strobe pulse. Input data is latched at falling edge of the signal.
2 to 9	DATA1 to 8	20 to 27	In	Each signal, from bit 0 to bit 7, represents parallel input data. HIGH means data 1; LOW means data 0.
10	/ACKNLG	28	Out	This signal (negative pulse) indicates that the printer has received data and is ready to accept more data.
11	BUSY	29	Out	This signal's HIGH level means that the printer is not ready to accept data.
12	PE	28	Out	This signal's HIGH level means the printer has a paper-out error.
13	SLCT	28	Out	Always HIGH when the printer is powered on.
14	/AFXT	30	In	Not used.
31	/INIT	30	In	This signal's negative pulse initializes the printer.
32	/ERROR	29	Out	This signal's LOW level means the printer is in an error state.
36	/SLIN	30	In	This signal is always HIGH when printer power is ON.
18	Logic H	—	Out	This line is pulled up to +5 V through 3.9K Ω resistor.
35	+5V	—	Out	This line is pulled up to +5 V through 1.0K Ω resistor.
17	Chassis	—	—	Chassis GND.
16,33 19-30	GND	—	—	Signal GND.
15,34	NC	—	—	Not connected.

Note:

In/Out refers to the direction of signal flow from the printer's point of view.

- The BUSY signal is active (HIGH) under the following conditions:
  - While receiving data.
  - When the input buffer is full.
  - When the INIT signal is active LOW.
  - When the /ERROR or PE signal is active.
  - During hardware initialization.
  - In the self-test mode.
  - In the adjustment mode.
  - In default-setting mode.
- The /ERROR signal is active LOW under the following conditions:
  - If there is a release lever error.
  - If there is a paper-out error.
  - If there is a paper-jam error.
- The PE signal is active HIGH under the following conditions:
  - If there is a paper-out error

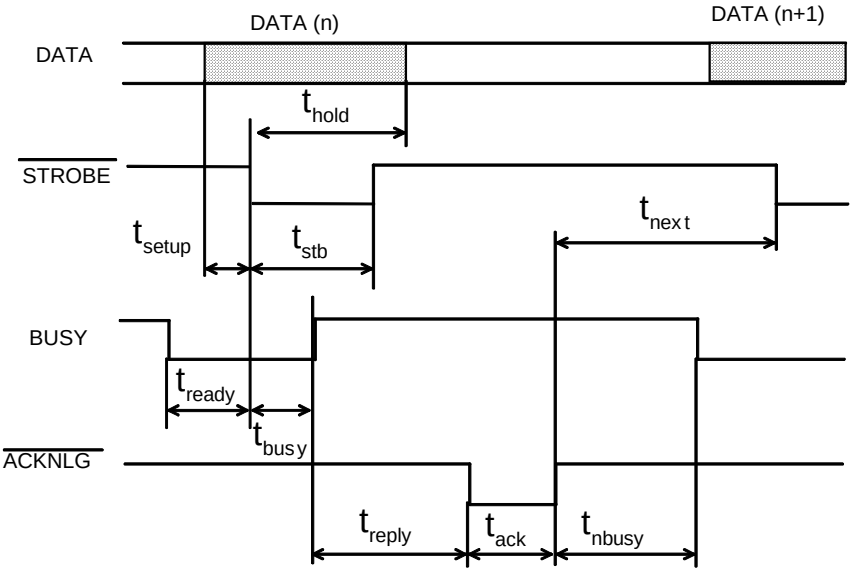


Figure 1-7. Data Transmission Timing

Table 1-24. Maximum and Minimum Timings for Data Transmission

Parameter	Minimum	Maximum
tsetup	500 nsec	—
thold	500 nsec	—
tstb	500 nsec	—
tready	0	—
tbusy	—	500 nsec
treply	—	—
tack	500 nsec	10 us
tnbusy	0	—
tnext	0	—
ttout*	—	120 nsec
ttin**	—	200 nsec

Notes:

** Rise and fall time of output signals.*
*** Rise and fall time of input signals.*

Parallel Interface (Reverse Channel)

- **Transmission mode** — IEEE-1284 nibble mode
- **Adaptable connector** — 57-30360 (Amphenol) or equivalent
- **Synchronization** — Refer to the IEEE-P1284 specification
- **Handshaking** — Refer to the IEEE-P1284 specification
- **Signal Level** — IEEE-1284 level 1 device
TTL compatible
- **Data transmission timing** — Refer to the IEEE-1284 specification

Table 1-25. Pin Assignments for Reverse Channel

Pin	Signal	Return GND Pin	In/Out*	Functional Description
1	HostClk	19	In	Host clock signal
2 to 9	DATA1~8	20 to 27	In	Parallel input data to the printer
10	PtrClk	28	Out	Printer clock signal
11	PtrBusy, DataBit-3,7	29	Out	Printer busy signal and reverse channel transfer data bit 3 or 7
12	AckDataReq, DataBit-2, 6	28	Out	Acknowledge data request signal and reverse channel transfer data bit 2 or 6
13	Xflag, DataBit-1, 5	28	Out	X-flag signal and reverse channel transfer data bit 1 or 5
14	HostBusy	30	In	Host busy signal
31	/INIT	30	In	Not used
32	/Data Avail, DataBit-0, 4	29	Out	Data available signal and reverse channel transfer data bit 0 or 4
36	1284-Active	30	In	1284 active signal
18	Logic-H	—	Out	This line is pulled up to + 5 V through 3.3K Ω resistor.
35	+5 V	—	Out	This line is pulled up to +5 V through 1.0K Ω resistor
17	Chassis	—	—	Chassis GND
16, 33, 19-30	GND	—	—	Signal GND
15, 34	NC	—	—	Not connected

Note:

** In/Out refers to the direction of signal flow from the printer's point of view.*

Interfaces

The FX-880 and FX-1180 include one built-in parallel interface card and one built-in card slot. The card slot accepts a variety of Type-B optional interface cards, as indicated by the table below.

Table 1-26. Type B Optional Interface Cards

Catalog Number	Interface
C823051	Serial interface card
C823071	32 KB intelligent serial interface card
C823141	Coax interface card
C823151	Twinax interface card
C823572	Ethernet interface card
C823452	Parallel interface card
C823121	LocalTalk interface card

Interface Selection

The printer selects the interface automatically, unless the user manually overrides it.

❑ **Manual selection**

The user can override automatic selection by selecting either the built-in parallel or the optional Type-B interface in the default setting mode. (See “Control Panel Operation” later in this chapter.)

❑ **Automatic selection**

Normally, interface selection is automatic. (This is the factory-set default, but it can be changed in the default settings.) With automatic selection enabled, the printer initializes to the idle state and scans its interfaces. When the printer receives data, the interface that receives the data first is selected. As long as the host continues sending data or the printer interface is busy, the selected interface remains active. When the host stops transferring data and the printer sits in standby for the number of seconds specified in the default settings, the printer returns to the idle state and the interface is de-activated.

❑ **Interface state and interface selection**

When the printer is initialized or returns to the idle state after printing, three things happen:

- The parallel interface goes into the ready state.
- If an optional interface card is installed, the printer sends it an enable command.
- If a serial interface card is installed, it sends an XON code and sets the DTR signal to SPACE.

When an interface is not selected, various things can happen:

- When the parallel interface is not selected, it goes into a busy state.
- When an optional interface card is installed and not selected, the printer sends a disable command to the optional interface.
- When the Type-B serial interface card is installed and it is not selected, the interface sends an XOFF code and sets the DTR signal to MARK.

Interrupt signals, such as the INIT signal for the parallel interface, are not effective unless the interface to which it is directed is selected.

Preventing Data Transfer Timeout in the Host

Generally, a host abandons data transfer to a peripheral when the peripheral is in the busy state for a period of 30 seconds or more, depending on the default settings of the host. To prevent time-out in the host, the printer begins receiving data more slowly after the input buffer has received several hundred bytes of data. Data transfer may then slow to as little as a few bytes per minute, with the printer registering a busy state only if the input buffer fills completely.

Control Panel Operation

This section tells how to use the FX-880 and FX-1180 control panel.

Control Panel

The printer control panel contains four non-lock-type pushbuttons and one lock-type power button, as well as various LEDs to report on printer functions.

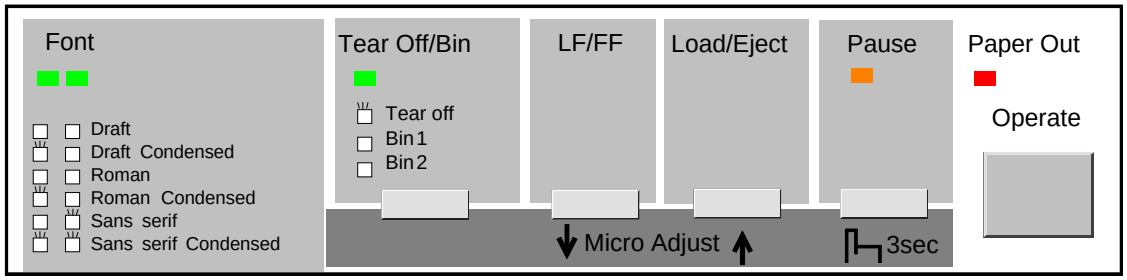


Figure 1-8. Control Panel

Overview of Functions

You can use the control panel to access a variety of printer functions; some of these functions are accessible only when the printer is in certain states, as explained below.

Operation in Normal Mode

During normal operation, the panel buttons perform the functions shown below.

Table 1-27. Operation in Normal Mode

Buttons	Function
Operate	▪ Turns the printer on and off.
Pause	▪ Alternates between printing and non-printing states. ▪ Activates the micro-adjust and font selection functions if held down for more than 3 seconds while the printer is not printing (buffer is empty); pressing it again turns these functions off.
Load/Eject	▪ Loads or ejects paper. ▪ Micro feeds forward, when the micro-adjust function is enabled.

LF/FF	▪ Performs a line feed if pressed momentarily. ▪ Performs a form feed if held down continously. ▪ Micro feeds backward, when the micro-adjust function is enabled.
Tear Off/Bin	▪ Advances continuous-feed paper to the tear-off position; if pressed again, repositions the paper to top-of-form (TOF). ▪ Selects CSF bin 1 or CSF bin 2.

Operation at Power-On

To access these functions, the button indicated below must be pressed while turning on the printer.

Table 1-28. Operation at Power On

Buttons	Function
Load/Eject	Performs a self-test in NLQ mode.
LF/FF	Performs a self-test in draft mode.
Load/Eject + LF/FF	Performs a data dump.
Pause + Tear Off/Bin	Clears the line counter (a value stored in the EEPROM, used to indicate ribbon life).
Pause	Performs a bidirectional adjustment.
Tear Off/Bin	Activates the Mode 1 default setting function.
Tear Off/Bin + LF/FF	Activates the Mode 2 default setting function.

Operation in the Default Setting Mode

When the printer is in the default setting mode, the panel buttons perform the functions shown below.

Table 1-29. Operation in Default Setting Mode

Buttons	Function
Tear Off/Bin	Selects the setting to be adjusted from a printed menu.
Load/Eject	Changes the setting’s value.

Details of Selected Functions

This section explains how to use several of the more complex functions.

Micro-Adjust Function

The micro-adjust function lets you set the top of form (TOF) and tear-off positions for your paper. Which position you adjust depends on whether the paper is in the TOF or the tear-off position when you make the adjustment. Adjustments can be made in increments of 1/216 inch. Use the Load/Eject button to move the paper up, and the LF/FF button to move it down.

You can activate the micro-adjust function by pressing the Pause button for at least 3 seconds when:

- ❑ The data buffer is empty and the printer is on-line.
- ❑ The paper is at the TOF or tear-off position.

When you press the Pause button again, the printer exits micro-adjust mode and the new position is automatically saved to the EEPROM so that the setting is not cleared if the printer is turned off.

Tear-off Function

The tear-off function advances continuous paper to the tear-off position. There are two modes for this function: auto tear-off and manual tear-off. You can select the tear-off mode in the default settings, explained later in this chapter.

Auto tear-off

In auto tear-off mode, the printer automatically advances the paper to the tear-off position when it has finished printing. After you tear the paper off at the perforation, the paper feeds back to the TOF position when a new print job is sent to the printer. The auto tear-off function is activated when:

- ❑ Auto tear-off has been set to ON in the default settings.
- ❑ The release lever has been set to one of the tractor positions.
- ❑ The data buffer is empty and the printer is on-line.
- ❑ More than 3 seconds have passed since the host computer finished transferring print data.

Manual tear-off

In manual tear-off mode, you must press the Tear Off/Bin button to advance the paper to the tear-off position. Pressing the button again returns the paper to TOF. The manual tear-off function can be activated if:

- ❑ Auto tear-off has been set to OFF in the default settings.
- ❑ The release lever has been set to one of the tractor positions.
- ❑ The printer is off-line; or, if the printer is on-line, the data buffer is empty.

Paper handling when in the tear-off mode

- If you press the Pause button with the printer off-line, the printer feeds the paper back to the TOF position for the next page and brings the printer back on-line.
- If you press the Pause button with the printer on-line, the printer feeds the paper back to the TOF position for the next page and takes the printer off-line.
- Pressing the LF/FF button feeds the paper back to the TOF position for the next page and executes a line feed.
- Pressing the Load/Eject button feeds the paper back to the TOF position for the next page and ejects paper backward.
- If the printer is turned off while in the tear-off mode, the tear-off position is saved, and paper is fed back to the TOF position for the next page when you turn the printer on again.

Changing the Default Settings

Default settings are special settings stored in the printer's EEPROM which remain active even after turning off the printer. The FX-880 and FX-1180 both have two default setting modes. You can change different printer settings in each of these modes.

When you enter the default setting mode, the printer prints out instructions for changing the settings, as well as a menu of options. In general, you use the Tear Off/Bin button to select from the printed menu the setting you wish to change, and the Load/Eject button to change the value of the setting. In addition to these buttons, you use four LEDs: the Font and TearOff/Bin LEDs to follow your menu selections, and the Pause and Paper Out LEDs to see the current settings.

Default Settings (Mode 1)

Refer to the following flowchart and its accompanying table to adjust the default settings in mode 1.

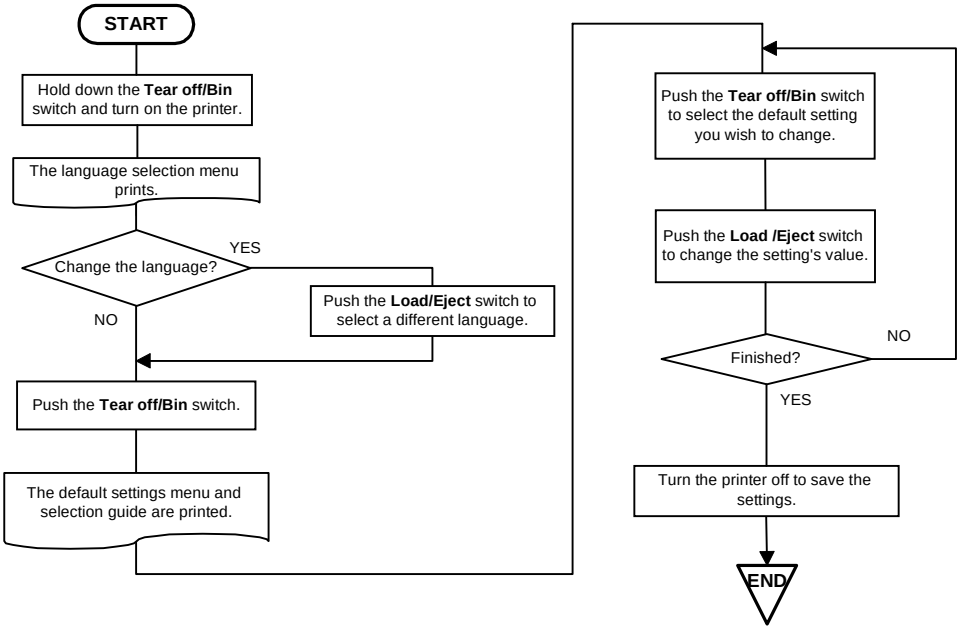

START
Hold down the **Tear off/Bin** switch and turn on the printer.
The language selection menu prints.
Change the language?
YES
NO
Push the **Load/Eject** switch to select a different language.
Push the **Tear off/Bin** switch.
The default settings menu and selection guide are printed.
Push the **Tear off/Bin** switch to select the default setting you wish to change.
Push the **Load /Eject** switch to change the setting's value.
Finished?
NO
YES
Turn the printer off to save the settings.
END

Figure 1-9. Changing Default Settings (Mode 1)

Note that in the following table, factory settings are shown in bold.

Table 1-30. Default Settings (Mode 1)

Item	Setting/Value
Skip over perforation	On, **Off**
Auto tear off	On, **Off**
Auto line feed	On, **Off**
Print Direction	**Bi-d**, Uni-d
I/F mode	**Auto,** Built-in Parallel, Optional Type-B
Auto I/F wait time	**10 sec**, 30 sec
Software	**ESC/P**, IBM 2380/2381 Plus
0 slash	**O**, Ø
High speed draft	**On**, Off
Input buffer	**On**, Off
Beeper	**On**, Off
Auto CR*	On, **Off**
I.B.M. character table*	**table 2**, table 1

Note:
** Auto CR and I.B.M. character table are available only when IBM 2380/2381 Plus emulation is selected.*

Default Settings (Mode 2)

Refer to the following flowchart and its accompanying table to adjust the default settings in mode 2.

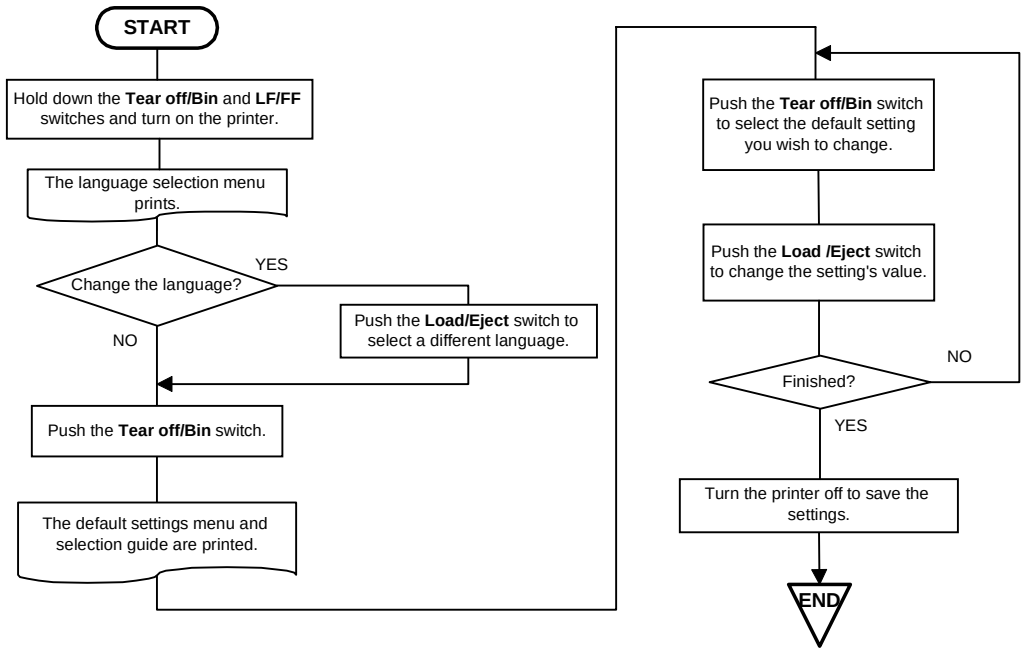

START
Hold down the Tear off/Bin and LF/FF switches and turn on the printer.
The language selection menu prints.
Change the language?
YES
Push the Load/Eject switch to select a different language.
NO
Push the Tear off/Bin switch.
The default settings menu and selection guide are printed.
Push the Tear off/Bin switch to select the default setting you wish to change.
Push the Load /Eject switch to change the setting's value.
Finished?
NO
YES
Turn the printer off to save the settings.
END

Figure 1-10. Changing Default Settings (Mode 2)

Note that in the following table, factory settings are shown in bold.

Table 1-31. Default Settings (Mode 2)

Item	Setting/Value
Page length for front tractor	3 inch, 3.5 inch, 4 inch, 5.5 inch, 6 inch, 7 inch, 8 inch, 8.5 inch, **11 inch**, 70/6 inch, 12 inch, 14 inch, 17 inch
Page length for rear tractor	3 inch, 3.5 inch, 4 inch, 5.5 inch, 6 inch, 7 inch, 8 inch, 8.5 inch, **11 inch**, 70/6 inch, 12 inch, 14 inch, 17 inch
Character tables	Italic, **PC437**, PC850, PC860, PC863, PC865, PC861, BRASCII, Abicomp, ISO Latin 1, Roman 8
	NLSP version: Italic, **PC437**, PC437 (Greek), PC774, PC850, PC852, PC853, PC855, PC857, PC866, PC866 (Latin), PC866 (UKR), PC869, ISO Latin 1T, MAZOWIA, Code MJK, Bulgaria, Estonia, ISO 8859-2, ISO 8859-7
International character sets for Italic table *	**Italic U.S.A**, Italic France, Italic Germany, Italic U.K., Italic Denmark 1, Italic Sweden, Italic Italy, Italic Spain 1

Note:

** The options available for this setting vary by country.*

Restoring Factory-Set Defaults

You can return all settings to their factory defaults by pressing the Tear Off/Bin and Load/Eject buttons while turning on the printer.

Bidirectional Adjustment Function

The bidirectional adjustment function allows you to adjust alignment at the following print speeds:

- High-speed draft mode
- Draft mode
- NLQ mode

The bidirectional adjustment can be performed either with a stand-alone printer, or using the adjustment program with a host computer connected to the printer. With a stand-alone printer, enter the bidirectional adjustment mode by pressing the Pause button while turning on the printer; the flowchart on the next page outlines this procedure.

To perform the adjustment with a host computer, see Chapter 4, *Adjustments*.

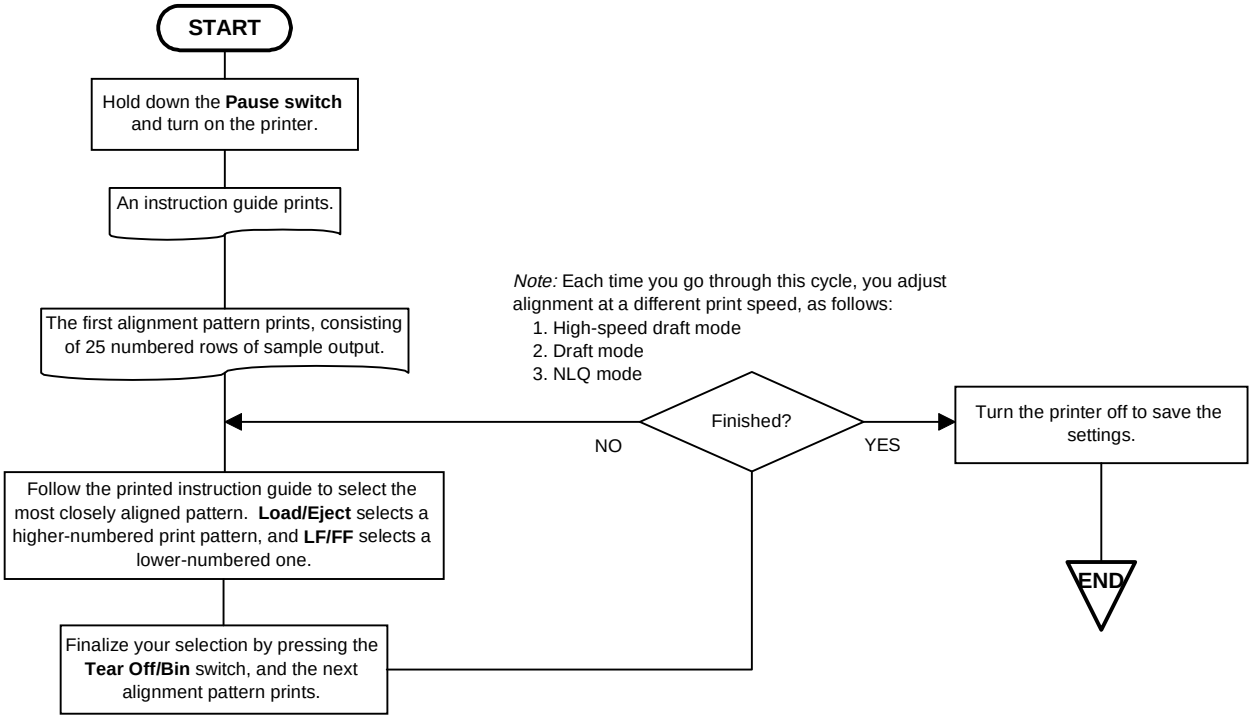

START
Hold down the **Pause switch** and turn on the printer.
An instruction guide prints.
The first alignment pattern prints, consisting of 25 numbered rows of sample output.
Note: Each time you go through this cycle, you adjust alignment at a different print speed, as follows:
1. High-speed draft mode
2. Draft mode
3. NLQ mode
Finished?
NO
YES
Turn the printer off to save the settings.
END
Follow the printed instruction guide to select the most closely aligned pattern. **Load/Eject** selects a higher-numbered print pattern, and **LF/FF** selects a lower-numbered one.
Finalize your selection by pressing the **Tear Off/Bin** switch, and the next alignment pattern prints.

Figure 1-11. Bidirectional Adjustment

Printer States and Error Reporting

This section describes various printer states and how the printer uses its beeper and LED indicators to report errors.

Initialization

Hardware Initialization

Initialization occurs when the printer is turned on or when the printer receives an /INIT signal (negative pulse) or cold-reset command (remote RS command). Initialization does the following:

- Initializes the printer mechanism.
- Clears all data in the buffers.
- Cancels downloaded character definition.
- Places the printer in standby state, if no errors occur.
- Executes software initialization (see below).

Software Initialization

The control code ESC @ also initializes the printer. This initialization

- Clears all unprinted data from the buffers.
- Resets all printer settings to their default values.

Error Conditions

If any of the following occurs, the printer reports an error and automatically goes off-line:

- Paper out, paper jam, or paper eject error
- Release lever operation error (detected when the position of the release lever does not match the paper path)
- Carriage control, power supply voltage, or CG access error

Conditions Indicated by the LEDs and Beeper

The following table shows how to interpret the printer's indicators.

Table 1-32. Beeper and LED Indicators

	Pause	Paper Out	Tear off/Bin	Condensed	Font	Beeper
Pause	On	—	—	—	—	—
Paper Out	On	On	—	—	—	❍ ❍ ❍
Paper Jam	On	Blinks	—	—	—	● ● ● ● ●
Paper Eject Error	On	Blinks	—	—	—	❍ ❍ ❍
Head Hot	Blinks	Blinks	—	—	—	—
Micro-adjust	Blinks	—	—	—	—	—
Tear Off	—	—	*1	—	—	—
Bin Selection	—	—	*1	—	—	—
Font Selection	—	—	—	—	*2	—
Fatal Error	Blinks	Blinks	Blinks	Blinks	Blinks	—
Release Lever Operation Error	On	—	—	—	—	● ● ● ● ●
Illegal Operation	—	—	—	—	—	❍

Notes:

**1 The Tear Off/Bin LED is ON when bin 1 is selected, and OFF when bin 2 is selected. The LED blinks when continuous paper is in the tear-off position.*

**2 The two font LEDs display the selected font.*

❍ *Indicates a beep lasting 100 ms followed by 100 ms of silence.*

● *Indicates a beep lasting 500 ms followed by 100 ms of silence.*

— *Indicates that the LED or beeper is not used to indicate this condition.*

Main Components

The main components of the FX-880 and FX-1180 are designed for easy removal and repair. The main components include the following:

- ❑ C229 MAIN Board Assembly
- ❑ C229 PSB/PSE/PSH Board Assembly
- ❑ C229 PNL Board Assembly
- ❑ Printer Mechanism (M-3J10)
- ❑ Housing Assembly

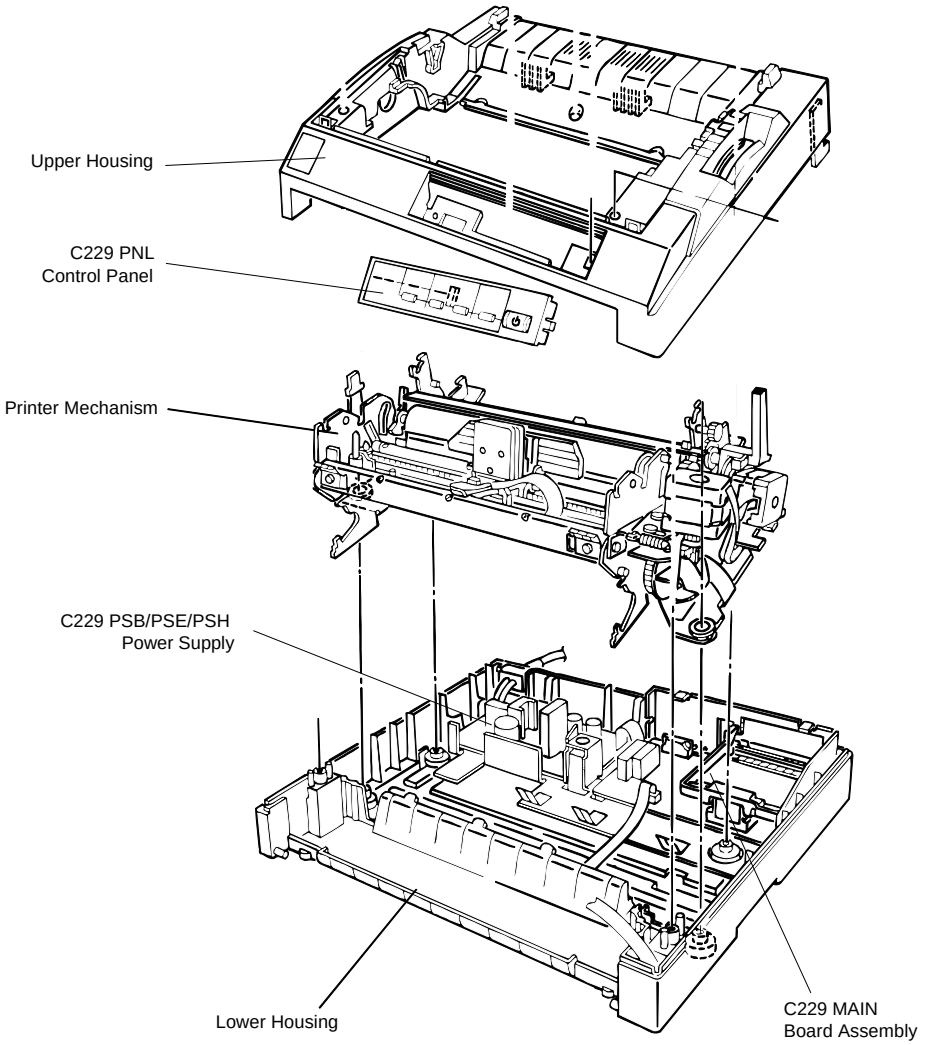


Figure 1-12. Main Components.

2. Operating Principles

Printer Mechanism Operation 2-1
- Printhead 2-2
- Carriage Unit 2-4
- Paper Handling Mechanisms 2-4
  - Paper Paths 2-5
- Ribbon Advance Mechanism 2-9
- Platen Gap Adjustment Mechanism 2-11
- Paper Feed Motor 2-11

Circuit Operation 2-12
- Power Supply – Circuit Types 2-12
  - Power Supply Operation 2-12
- Control Circuit 2-14

Printer Mechanism Operation

This section describes the FX-1180 and FX-880 printer mechanism, which features a 9-pin serial impact dot matrix printhead. The printer mechanism consists of the following parts:

- ❑ Printhead
- ❑ Carriage unit
- ❑ Paper handling mechanisms
- ❑ Ribbon advance mechanism
- ❑ Platen gap adjustment mechanism
- ❑ Paper feed (PF) motor
- ❑ Carriage (CR) motor
- ❑ Sensors

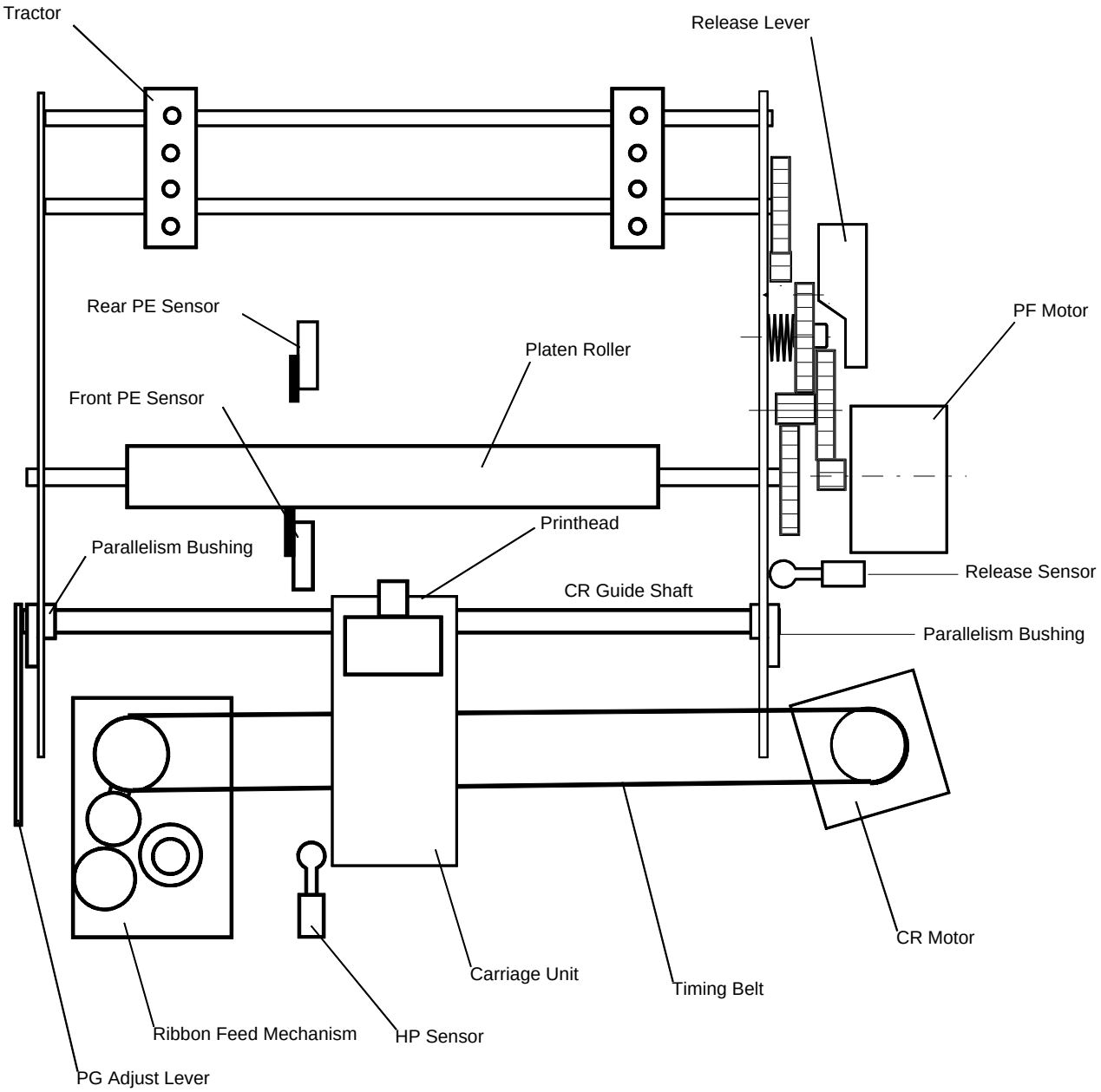


Figure 1. Printer Mechanism

Printhead

The printhead transfers ink to the printed page by means of 9 wires which strike the ink ribbon as the printhead travels across the page. Each wire has its own drive coil that is actuated by a separate signal from the printhead drive circuitry. Figure 2 depicts one of the nine independent drive coil mechanisms.

As shown in the diagram below, the head driving coil, when energized, pulls against the actuating plate. This thrusts the dot wire against the ink ribbon and creates a printed dot. (The ribbon mask prevents the ribbon from smudging the paper as the printhead moves back and forth across the page.)

After striking the ink ribbon, the driving coil is shut off and the dot wire returns to its original position. This is accomplished by the wire resetting spring, which is aided by the rebound action of the dot wire hitting the platen.

Since the printhead heats up after a period of use, it is equipped with a thermistor to detect head temperature. Voltage changes reflecting changes in the thermistor's resistance are output to the CPU. Should the printhead overheat, the CPU detects this and automatically stops printing until the printhead cools.

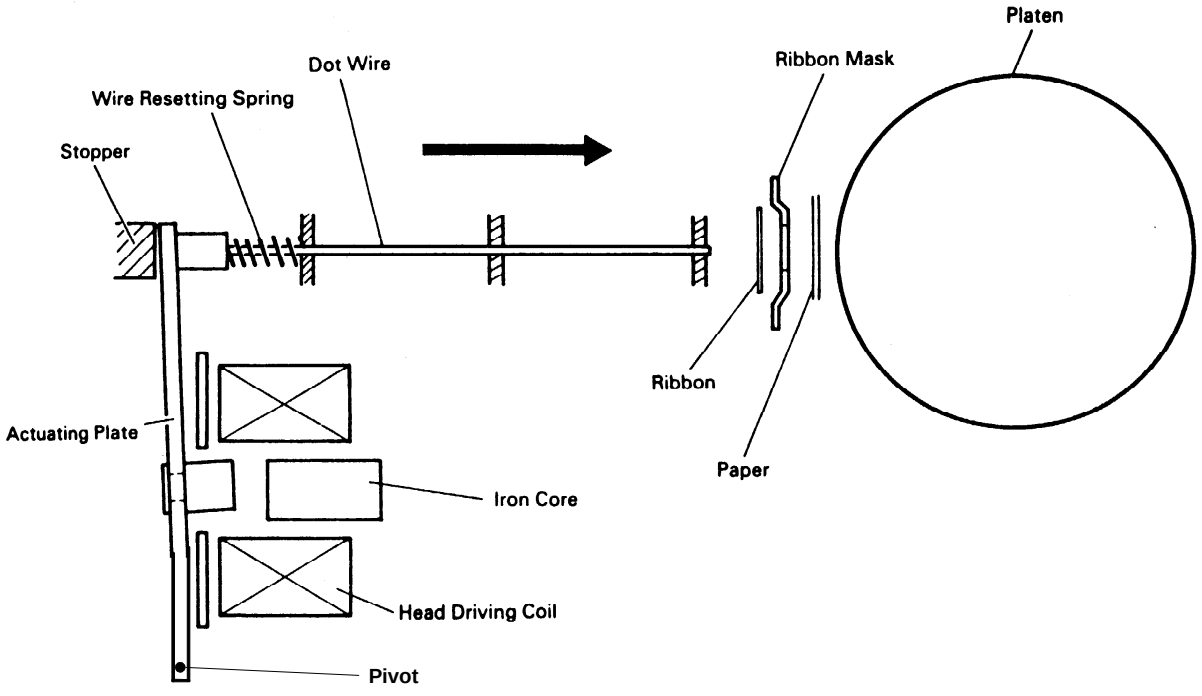


Figure 2. Printhead Drive Coil Mechanism

Carriage Unit

The carriage unit transports the printhead back and forth across the printed page. It is driven by the carriage (CR) motor—a stepper motor—via the timing belt, which connects to the underside of the carriage. The carriage slides along the carriage guide shaft, which maintains the printhead's horizontal alignment with the platen, while the base frame provides further support and maintains the printhead's vertical alignment. The home position (HP) sensor detects the home position of the carriage at power-on and when the CR motor changes direction.

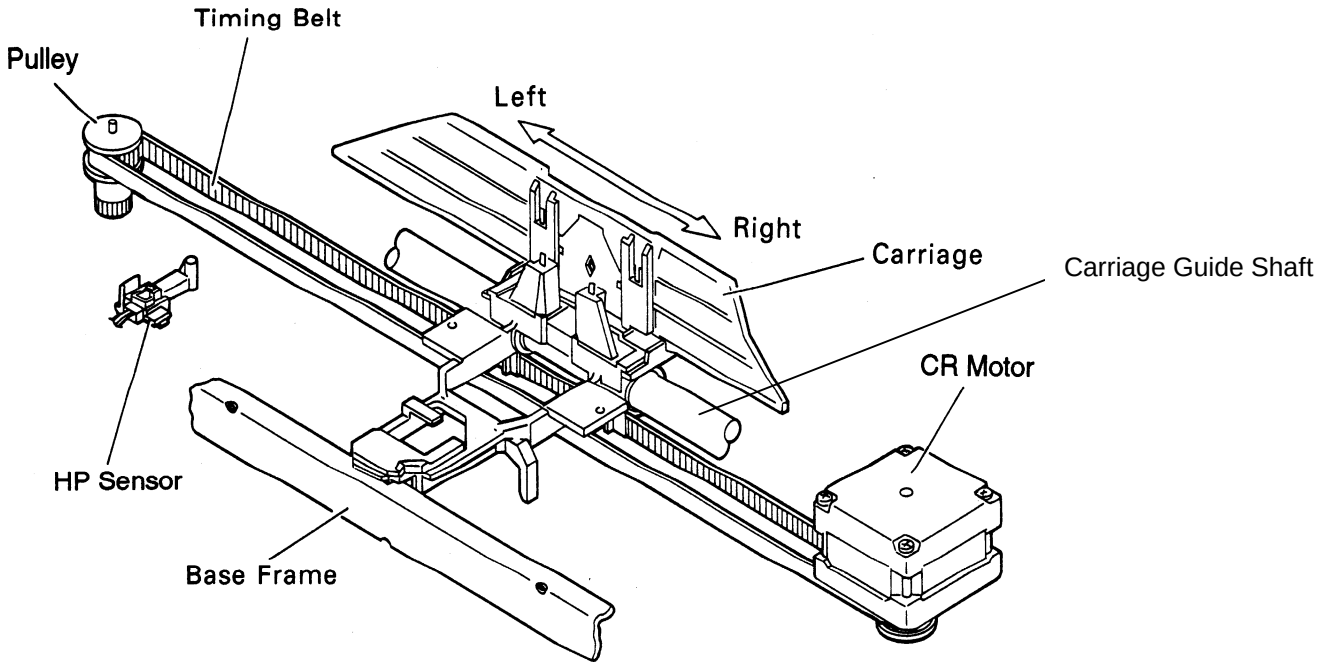


Figure 3. Carriage Unit

Paper Handling Mechanisms

Cut sheets are fed by friction. Continuous paper is fed by tractor. There are three ways to feed paper with tractors: the push tractor method, the pull tractor method, and the push-pull tractor method. During normal operation, the printer is set up with only one tractor, which functions as either a push or pull tractor, depending on where it is attached on the printer. To use the push-pull tractor feed method, an optional tractor must be attached.

The paper release lever is used to switch PF motor torque between cut sheet (friction) feeding and continuous paper (tractor) feeding. In addition, the paper release sensor detects the release lever's setting position. This lets the main logic board know what type of paper is loaded and how many lines to print per page. (Cut sheets print at 61 lines per page, while continuous paper prints at 66 lines per page.)

Paper Paths

Different kinds of paper feed through the printer in different ways. The paths different kinds of paper follow are divided into four groups, depending on the entrance the paper is fed from (front, rear, bottom, or top).

❑ Top Entrance

The following figure shows the paper path for friction feeding using the top entrance. The top entrance is used only for the friction feed method. When the top entrance is used, the rear PE sensor senses when paper is out.

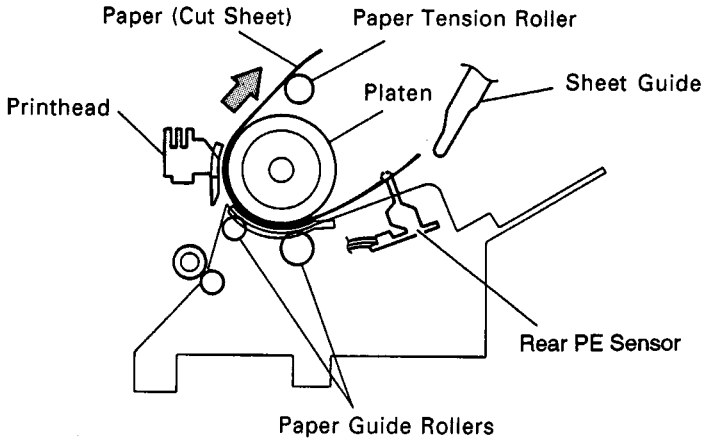


Figure 4. Paper Path for Friction Feeding Using the Top Entrance

❑ Rear Entrance

Figures 5, 6, and 7 show the paper paths for tractor feeding using the rear entrance. The rear entrance can be used for any of the following paper feed methods: push tractor feed, pull tractor feed, or push-pull tractor feed. When the rear entrance is used, the rear PE sensor senses when paper is out.

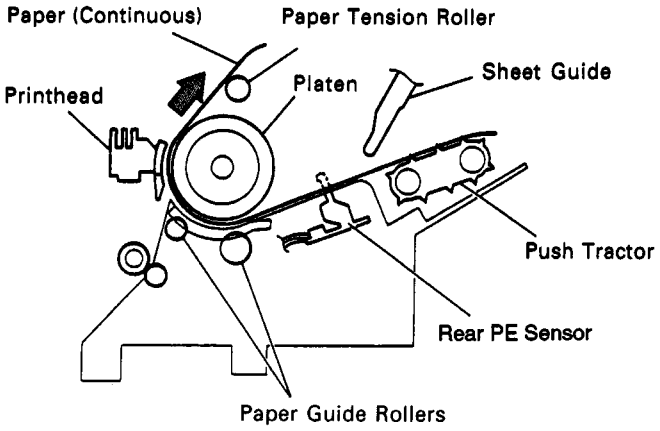


Figure 5. Paper Path for Push Tractor Feeding Using the Rear Entrance

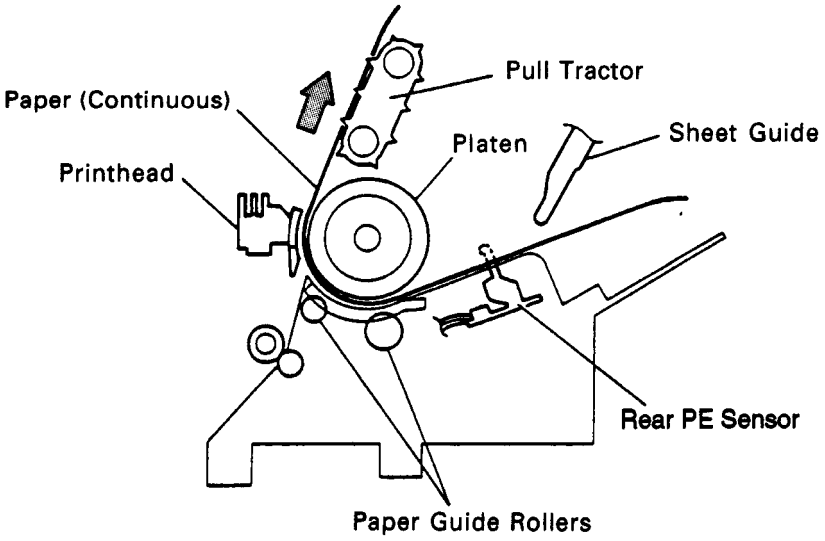


Figure 6. Paper Path for Pull Tractor Feeding Using the Rear Entrance

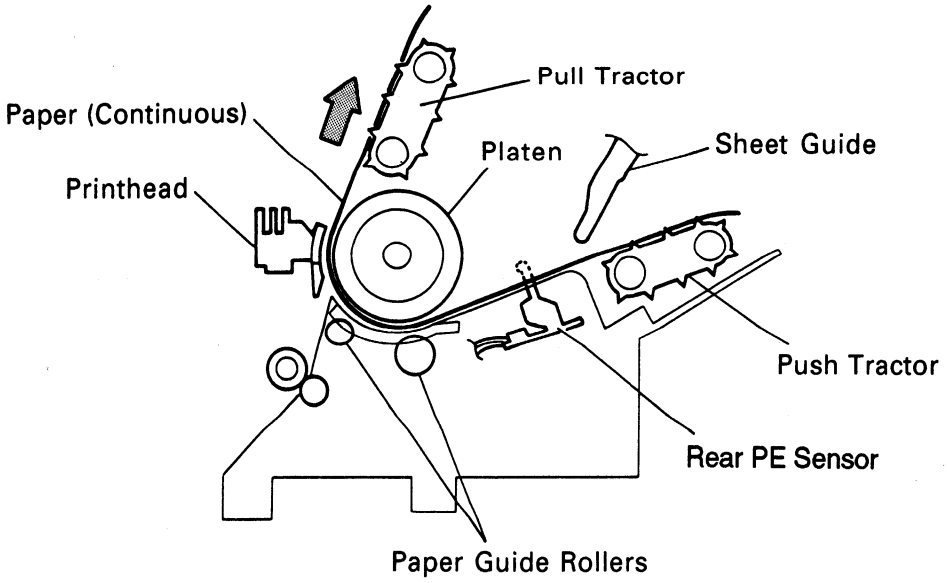


Figure 7. Paper Path for Push-Pull Tractor Feeding Using the Rear Entrance

❑ Bottom Entrance

The following figure shows the paper path for tractor feeding using the bottom entrance. The bottom entrance is used only for pull tractor feeding. When the bottom entrance is used, the front PE sensor senses when paper is out.

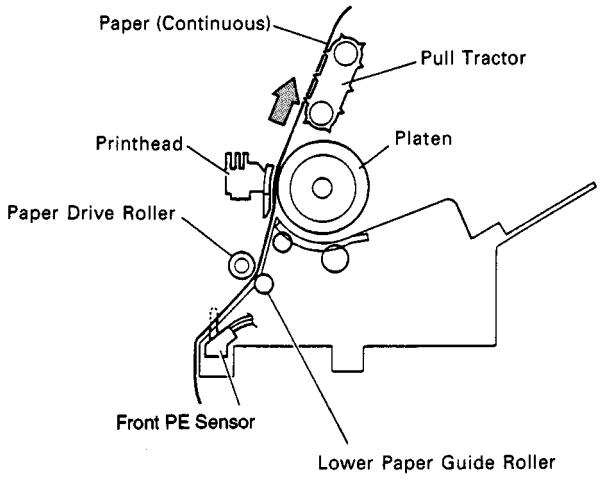


Figure 8. Paper Path for Pull Tractor Feeding Using the Bottom Entrance

❑ Front Entrance

Figures 9 through 12 show the paper paths for the front entrance. The front entrance can be used with any of the following paper feed methods: friction feed, push tractor feed, pull tractor feed, or push-pull tractor feed. When the front entrance is used, the front PE sensor senses when paper is out.

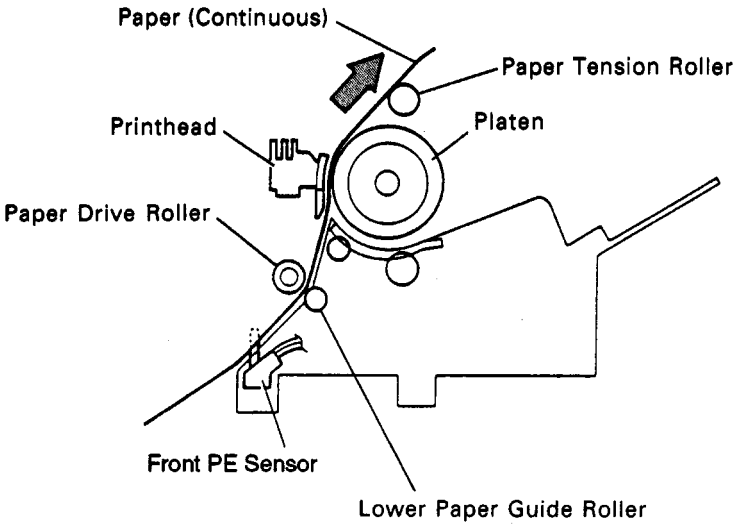


Figure 9. Paper Path for Friction Feeding Using the Front Entrance

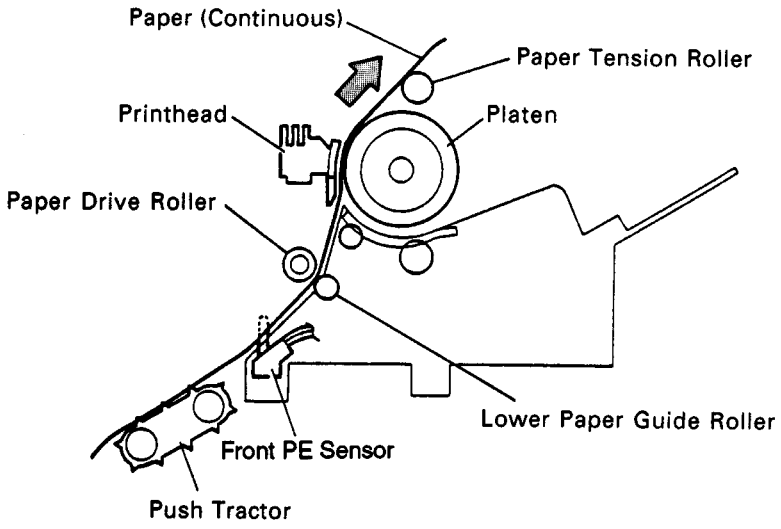


Figure 10. Paper Path for Push Tractor Feeding Using the Front Entrance

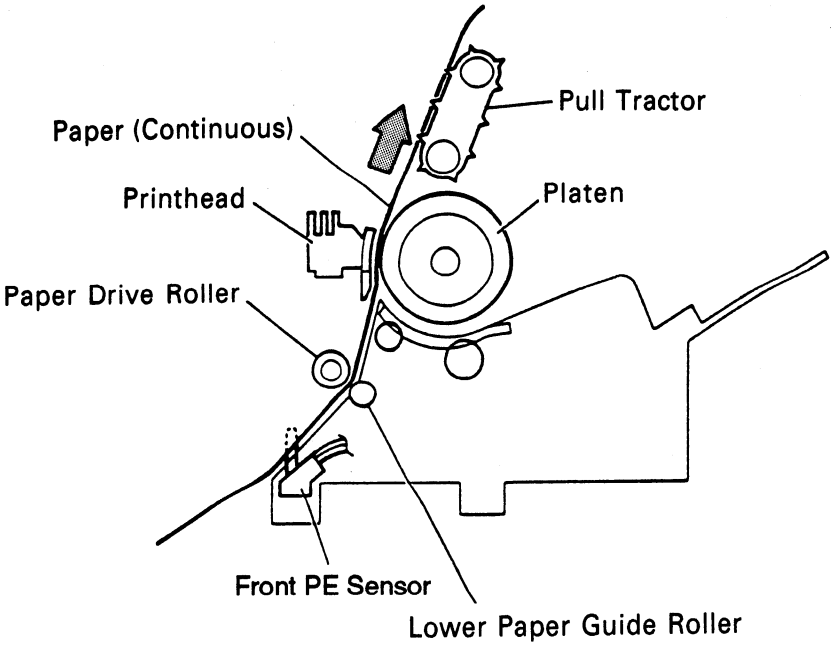


Figure 11. Paper Path for Pull Tractor Feeding Using the Front Entrance

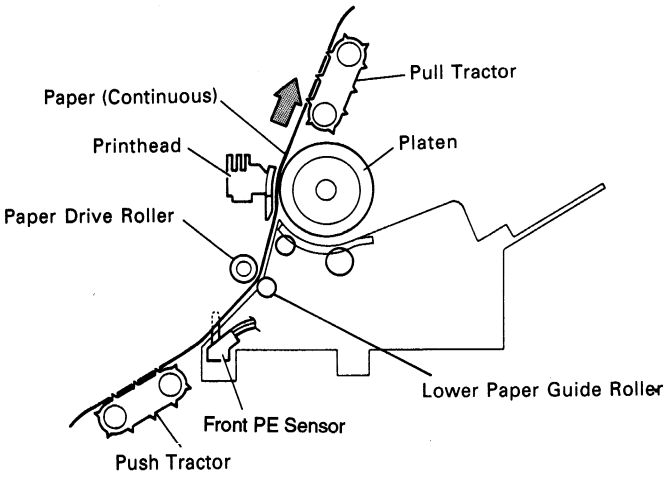


Figure 12. Paper Path for Push-Pull Tractor Feeding Using the Front Entrance

❑ **Summary of Paper Paths**

The various paper paths diagrammed above are summarized below in tabular form:

Table 1. Possible Combinations of Feed Methods and Paper Entrances

Feed Method	Paper Entrance			
	Top	**Rear**	**Front**	**Bottom**
Friction	Yes	No	Yes	No
Push tractor	No	Yes	Yes	No
Pull tractor	No	Yes	Yes	Yes
Push-pull tractor	No	Yes	Yes	No

Ribbon Advance Mechanism

The ribbon advance mechanism is driven by the same timing belt that moves the printhead back and forth across the printed page. To make the ribbon feed in one direction only, the timing belt connects to a specially designed gear linkage which always turns the ribbon advance roller counterclockwise, no matter which direction the printhead is moving.

In the figure below, black arrows indicate directional movement when the printhead carriage travels left to right. In this case, motion transfers through the gear linkage as follows:

Belt Pulley → Sun Gear → Planet Gear → Gear 1 → Ribbon Driving Gear

Note that the belt pulley and the sun gear are on the same axle and rotate together as a unit.

When the printhead carriage changes direction, the planet gear, which pivots on the planet gear lever, disengages from gear1, swings over, and engages with gear 2. Motion then continues to pass through gear 3 and on to the ribbon driving gear. In this way, the ribbon driving gear always turns counter-clockwise, no matter which direction the printhead is moving.

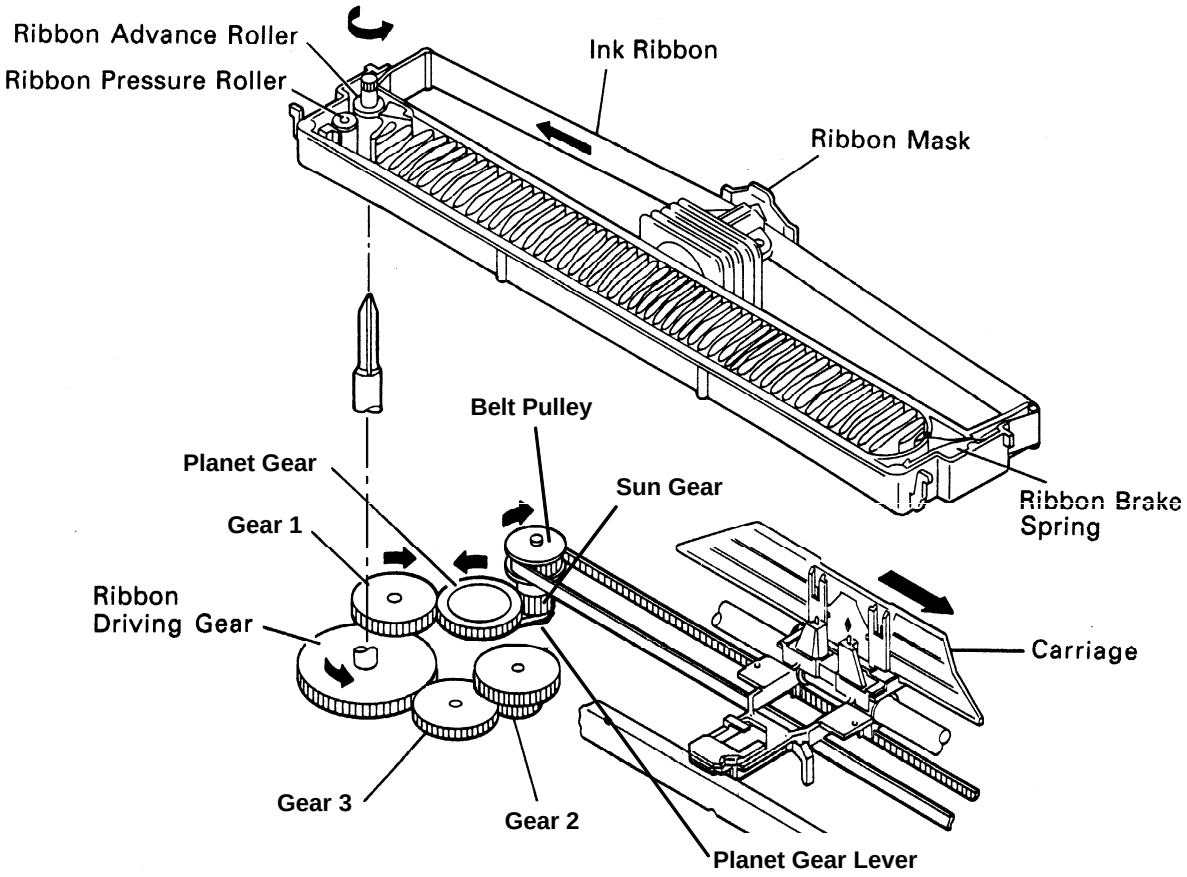


Figure 13. Ribbon Advance Mechanism

The ribbon cartridge itself contains several mechanisms to ensure proper guidance of the ribbon. At the entrance slot, a pressure roller clamps the ribbon against the advance roller, enabling the advance roller to "grab" the ribbon and draw it in. The ribbon brake spring, attached to the exit slot of the cartridge case, prevents slack in the ribbon and keeps its tension at a constant level. Finally, the ribbon mask prevents the ribbon from brushing against the paper.

Platen Gap Adjustment Mechanism

The platen gap (the gap between the platen and the printhead) can be adjusted to allow the printer to use paper of different weights or thicknesses. When the platen gap adjust lever is moved forward or backward, the carriage guide shaft rotates. Because the carriage guideshaft is eccentric at the ends, this rotation moves the carriage either toward or away from the platen, and changes the platen gap. The platen gap (PG) sensor detects the position of the adjust lever. The correct platen gap is 0.38 mm ± 0.02 mm with the adjust lever set to position 0. If the lever is set to position 2 (the 5th slot from the top) or higher, the printer goes into copy mode.

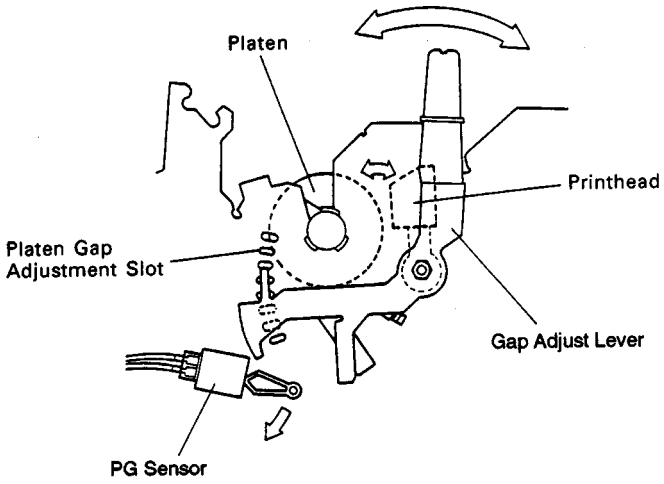


Figure 14. Platen Gap Adjustment Mechanism

Paper Feed Motor

The paper feed (PF) motor advances the paper at minimum increments of 1/216 inch. This motor is a 2-2 phase, constant-voltage stepper motor. CPU ports P70 to P73 generate phase signals to drive the motor. PFA to PFB are turned on or off within the μPA1476H (IC1), depending on the phase data sent from the CPU.

When pin A19 of the CPU goes HIGH, D1 outputs +35 volts to hold the motor stationary.

Circuit Operation

Power Supply – Circuit Types

The FX-1180 and FX-880 printers can be powered by any of three power supply boards: the C229 PSB board (120 V), the C229 PSE board (230 V), or the C229 PSH board (UPS). The output of these boards supplies the DC current necessary to drive the printer control circuits and the printer drive mechanism. Though all three boards provide the same output, their primary circuitry differs.

The input voltages and fuse ratings for these boards are shown in the following table.

Table 2. Power Supply Boards

Board	Input Voltage	Input Frequency Range	Fuse F1 Rating
C229 PSB	85 to 138 VAC	49.5 to 60.5 Hz	4 A / 125 V, 250 V
C229 PSE	187 to 276 VAC	49.5 to 60.5 Hz	T2.0 A / 250 V
C229 PSH	85 to 276 VAC	49.5 to 60.5 Hz	T4.0 A / 250 V

Power Supply Operation

The table below describes the two power supply output voltages and lists their applications.

Table 3. Power Supply Output Voltages and Applications

Output Voltage (DC)	Rated Output Current	Applications
+5 V ± 5%	0.7 A	❑ Main control board logic circuitry ❑ Sensors ❑ Control panel LEDs
+35 V ± 6%	0.8 A	❑ Printhead drive ❑ CR motor drive ❑ PF motor drive

The power supply circuit consists of a line filter, a ZC-RCC (Zero-Cross Ringing Choke Converter) switching circuit, and a 5 V chopper regulator IC. When AC power enters the printer from an external power source, the line filter circuit removes high-frequency noise. The AC voltage then undergoes full wave rectification and is smoothed to produce direct current. The voltage is then fed through the switching circuit and a secondary smoothing circuit to produce a stepped down +35 VDC voltage; feedback ensures stable output. A second, additional output at +5 VDC is produced by a chopper regulator IC which draws from the 35 V supply.

To protect the printer, the power supply board incorporates over-voltage and over-current protection circuitry. If the 5 V supply exceeds +7 VDC, or if the 35 V supply exceeds +36 VDC, the operation of the ZC-RCC switching circuit is immediately stopped, and its output falls to zero. In addition, a voltage drop protection circuit protects the printer in case of a short circuit in any component that draws from the +35 VDC line. If a voltage drop is detected, this also stops the operation of the ZC-RCC. Fuse F1 protects the power supply itself.

Normally, the printer is turned on and off using the Operate switch on the front control panel. When the printer is turned off, the switching circuit is de-energized and output at +35 VDC stops. However, since the Operate switch is in the secondary circuitry, current continues to flow in the primary circuitry as long as the printer remains plugged in. Therefore, you should unplug the printer from the external AC power source before performing maintenance.

The following figure shows the power supply circuitry in block diagram form.

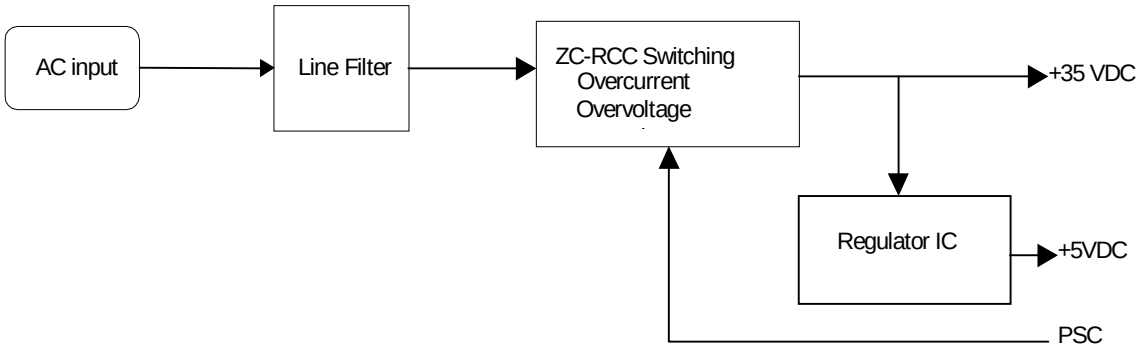


Figure 15. Power Supply Circuit Block Diagram

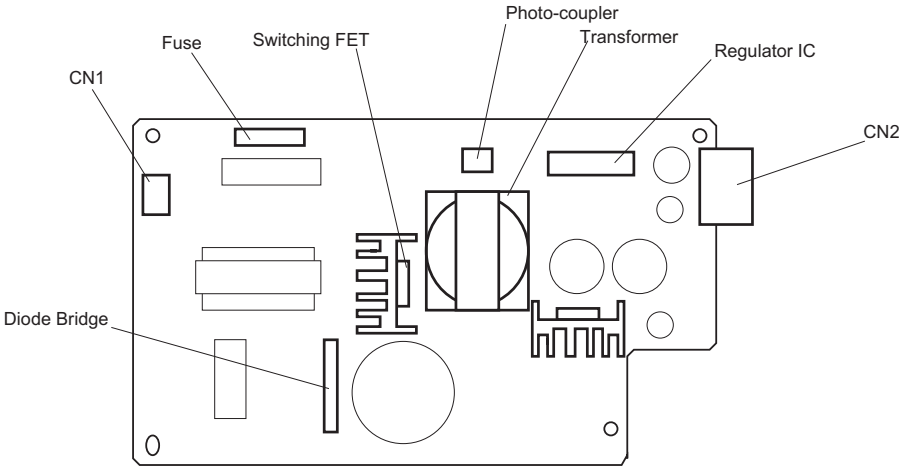


Figure 16. Power Supply Board Component Layout (C229 PSB/PSE/PSH)

Control Circuit

The C229 MAIN board is the control circuit board for the FX-1180 and FX-880. The control circuit includes a TM96C141AF CPU that runs at 14.47 MHz, an E05B50 gate array that contains various memory management functions, a reset IC, EEPROM, etc. The table below shows the functions of the main board components.

Table 4. MAIN Board Components and Functions

Component	Address	Function
TMP96C141AF	IC3	CPU; controls the C229 main board. It performs the functions below: ❏ Receives data from the host computer and loads it to the input buffer in RAM ❏ Expands the input data held in the buffer to create image data ❏ Loads the image data to the image buffer in RAM ❏ Transfers the image data to the printhead drive circuit ❏ Controls various printer mechanism parts, such as motors.
E05B50	IC2	Gate array; performs the functions below: ❏ Controls the printhead ❏ Controls the parallel and optional type B interface ❏ Controls the control panel ❏ Controls the PF motor and changes over the CR motor current
PST594E	IC1	Reset IC for performing a system reset.
AT93C46	IC4	EEPROM, used to store information such as top-of-form position.
PSRAM	IC5	The PSRAM contains the CPU working area and buffers.
ROM	IC7	2/4 MB EEPROM and Mask ROM.
SLA7024M	IC8	Driver circuit for the carriage return (CR) motor.
A2917SEB	IC11	Driver circuit for the paper feed (PF) motor.
Comparator	IC12	Power-off signal sensing.

The following illustration shows the control circuits in block diagram form.

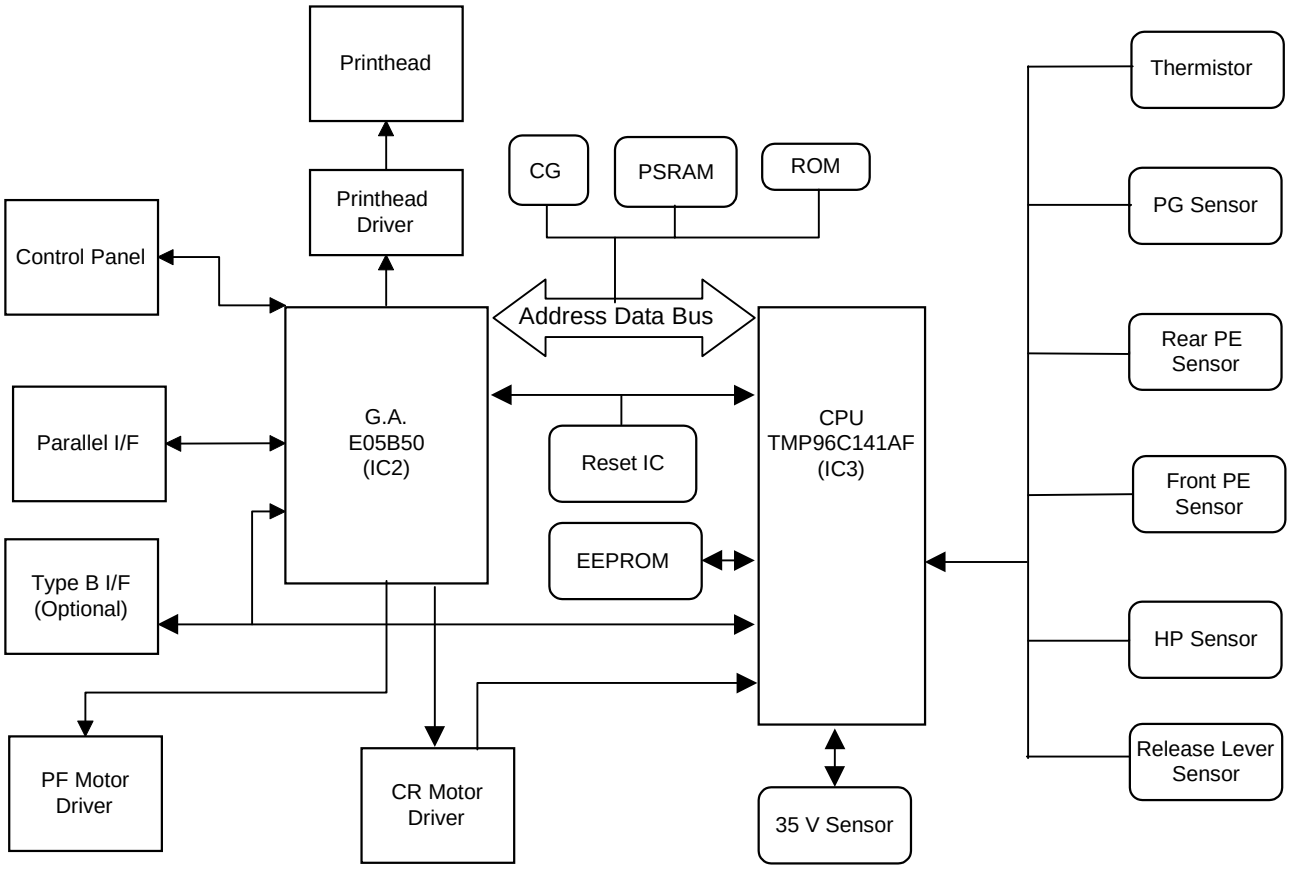


Figure 17. Control Circuit Block Diagram

Data from the host computer is first stored in the printer's input buffer. The printer then converts it into image data, stores it in the image buffer, and then transfers it to the printhead via the gate array. This is shown in the diagram below:

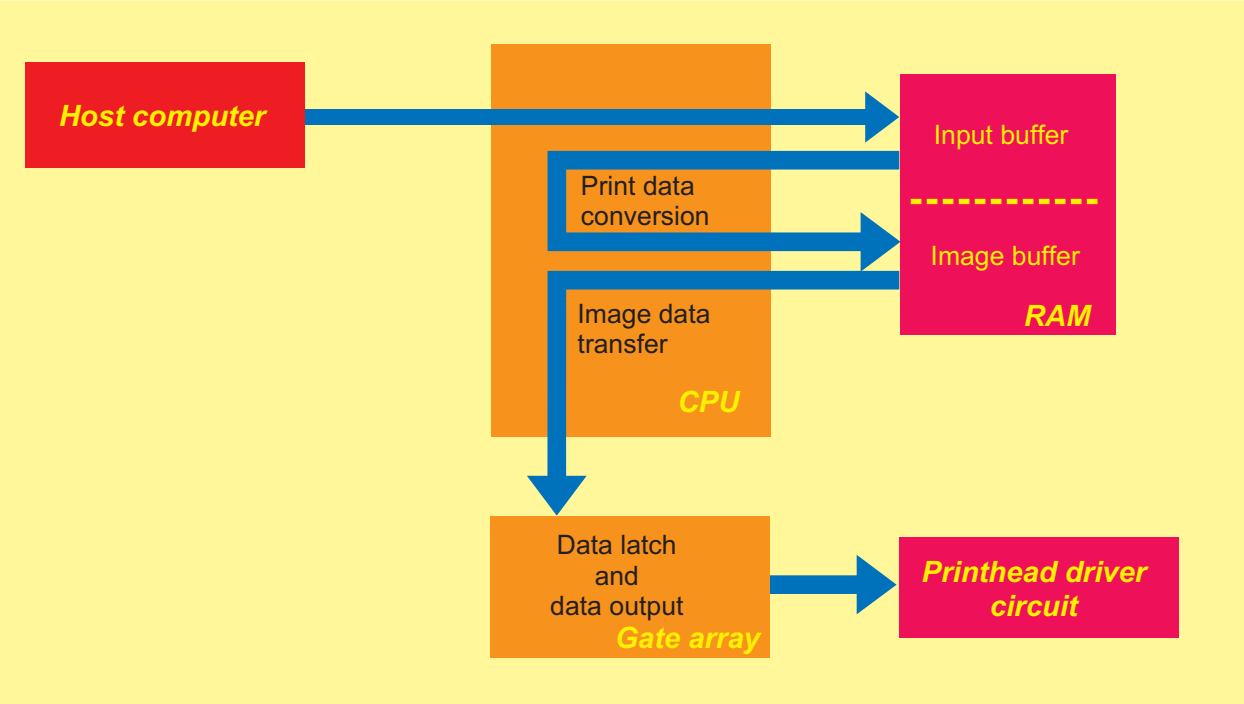


Figure 18. Data Flow

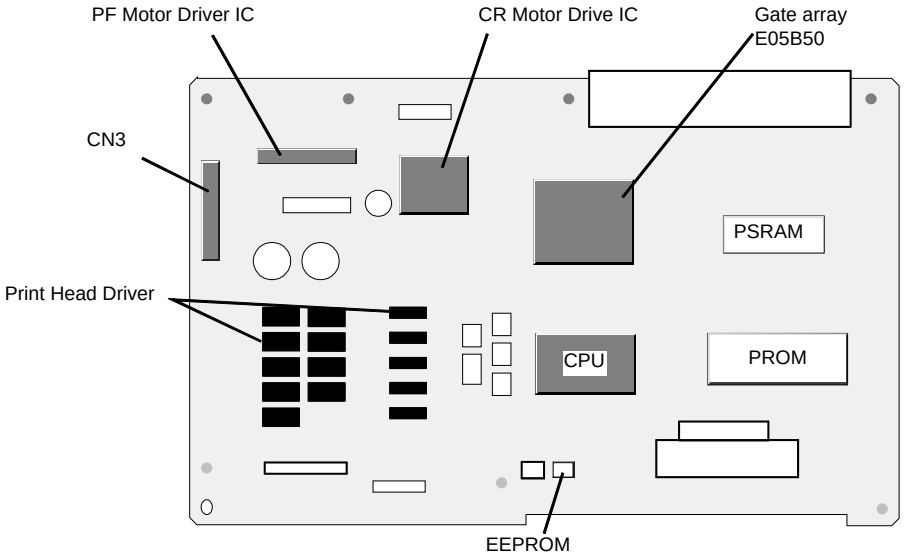


Figure 19. MAIN Board Component Layout (C229)

3. Disassembly and Assembly

Overview 3-1
- Printer Disassembly Precautions 3-1
- Tools 3-2
- Service Checks after Repair 3-3
- Screw Specifications 3-4

Printer Disassembly and Assembly 3-5
- Printhead Removal 3-6
- HP (Home Position) Sensor Removal 3-7
- Disassembly Preparation 3-8
- Upper Housing Removal 3-9
- C229 Main Board Removal 3-11
- C229 PSB/PSE Board Removal 3-13
- ROM Removal 3-14
- Platen Removal 3-15
- Printer Mechanism Removal 3-17
- Printer Mechanism Disassembly 3-19
  - CR Motor Removal 3-19
  - PF Motor Removal 3-21
  - PF Gear Train Disassembly 3-22
  - PG (Platen Gap) Sensor Removal 3-24
  - Release Lever Sensor Removal 3-25
  - Front PE (Paper End) Sensor Removal 3-26
  - Rear PE Sensor Removal 3-27
  - Carriage Removal 3-28
  - Rear Paper Guide Removal 3-30
  - Ribbon Drive Removal 3-32

Overview

This chapter describes procedures for disassembling the EPSON FX-880 and FX-1180. Unless otherwise specified, you can assemble the components by reversing the disassembly procedures.

Printer Disassembly Precautions

When working on the EPSON FX-880 or FX-1180, follow the warnings and cautions below.

⚠ WARNING

- *Disconnect the power cable before opening the printer case.*
- *Do not open the printer for at least five minutes after disconnecting the power cable to allow the electrolytic capacitor to discharge completely.*
- *Never touch primary parts of the power supply unit (including the heat sink) while the power supply cable is connected to the power socket. The heat sink is not electrically isolated.*
- *Don't touch the heat sink even after power has been disconnected, as it may be very hot.*
- *Don't touch the printhead after printing, as it may be very hot.*

⚠ CAUTION

- *Use only recommended tools for maintenance work.*
- *Use only recommended lubricants and adhesives. (See Chapter 6.)*
- *Always follow the instructions in this manual when you perform any adjustment on the printer. (See Chapter 4.)*

Tools

Table 3-1 lists the required tools for disassembling, assembling, or adjusting the printer. Use only the specified tools to avoid damaging the printer.

Table 3-1. Required Tools

Name	Availability	EPSON Part No.
Phillips screwdriver (no. 2)	Commercially available	B743800200
Phillips screwdriver (no. 1)	Commercially available	B743800100
Hexagonal box driver (7 mm diagonal)	Commercially available	B741700200
Tweezers	Commercially available	B741000100
Round-nose pliers	Commercially available	B740400100
E-ring holder #6	Commercially available	B740800800
Soldering Iron	Commercially available	B740200100
Thickness gauge (t=0.42 mm)	Commercially available	B776702201
Multimeter	Commercially available	—
Oscilloscope (50 MHz min.)	Commercially available	—
Extractor (for removing rivet in PSB)	EPSON part	EXTRACTOR

Note:
An oscilloscope is required only for making repairs at the component level.

Service Checks after Repair

Before returning the printer after service, use the check list in Table 3-2, which provides a record to make servicing and shipping more efficient.

Table 3-2. Inspection Check List for the Repaired Printer

Category	Component	Item to Check	Status
Printer mechanism	Printhead	Are any wires broken?	☐Checked ☐Not necessary
		Are any wires worn out?	☐Checked ☐Not necessary
	Carriage mechanism	Does the carriage move smoothly? ☐ Movement noisy? ☐ Mechanism dirty? ☐ Mechanism oily?	☐Checked ☐Not necessary
		Is the CR motor at the correct temperature (not overheating)?	☐Checked ☐Not necessary
	Paper advance mechanism	Is paper advancing smoothly? ☐ Movement noisy? ☐ Mechanism dirty? ☐ Mechanism oily? ☐ Paper jamming?	☐Checked ☐Not necessary
		Is the paper feed motor running at the correct temperature (not overheating)?	☐Checked ☐Not necessary
	Paper path	Is the *type* of paper in the printer feeding smoothly?	☐Checked ☐Not necessary
		Is the tractor feeding the paper correctly?	☐Checked ☐Not necessary
		Is the paper path clear of all obstructions?	☐Checked ☐Not necessary
		Is the platen free of damage?	☐Checked ☐Not necessary
	Ribbon mask	Is the ribbon mask free of distortion?	☐Checked ☐Not necessary
Operation	Self-test	Was the self-test successful?	☐Checked ☐Not necessary
	On-line test	Was the on-line test successful?	☐Checked ☐Not necessary
Adjustments	Platen gap	Is the platen gap adjusted correctly?	☐Checked ☐Not necessary
	Bi-D adjustment	Is the bi-directional print position adjusted correctly?	☐Checked ☐Not necessary
Firmware	ROM chip	Check that the printer has the latest ROM version.	☐Checked ☐Not necessary
Packing	Ribbon cartridge	Has the ribbon been removed?	☐Checked ☐Not necessary
	Attachments and accessories	Have all the printer's attachments and accessories been included in the package?	☐Checked ☐Not necessary

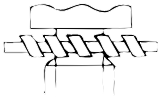
Screw Specifications

Table 3-3 lists the abbreviations used in the following pages for small parts, such as screws and washers.

Table 3-3. Screw Types and Abbreviations (I)

Abbreviation	Description
CB	Cross Bind-head screw
CBS	Cross Bind-head S-tight screw
CBB	Cross Bind-head B-tight screw
CBP	Cross Bind-head P-tight screw
CP	Cross Pan-head screw
CB(O)	Cross Bind-head screw with outer toothed lock washer

Table 3-4. Screw Types and Abbreviations (II)

Head	Body	Washer
Bind-head	S-tight	Outer toothed lock washer 
Pan-head	B-tight	
	P-tight	

Printer Disassembly and Assembly

This section provides disassembly procedures. The basic order for disassembly is shown in the flowchart below. Exploded diagrams are also provided in the Appendix. Refer to the Appendix if necessary to see how components fit together.

⚠ WARNING

Before disassembling any part of the printer, note the warnings in Printer Disassembly Precautions on page 3-1.

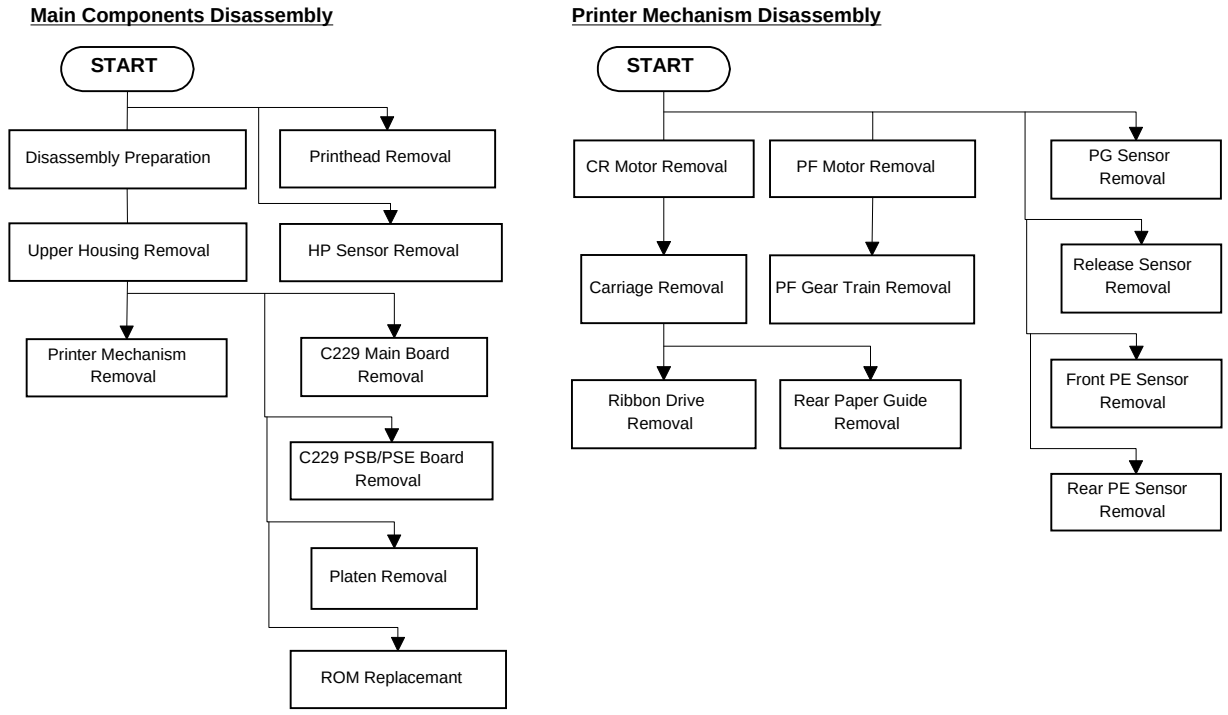


Figure 3-1. Disassembly Flowchart

Printhead Removal

1. Remove the top cover.
2. Remove the 2 CBS screws (M3 x 8) securing the printhead to the carriage assembly.
3. Disconnect the FFC from the printhead and remove the printhead.

⚠ WARNING

Wait for five minutes after unplugging the printer before removing the printhead; it is very hot and needs to cool down.

⚠ CAUTION

After replacing the printhead, perform the platen gap adjustment (see Chapter 4).

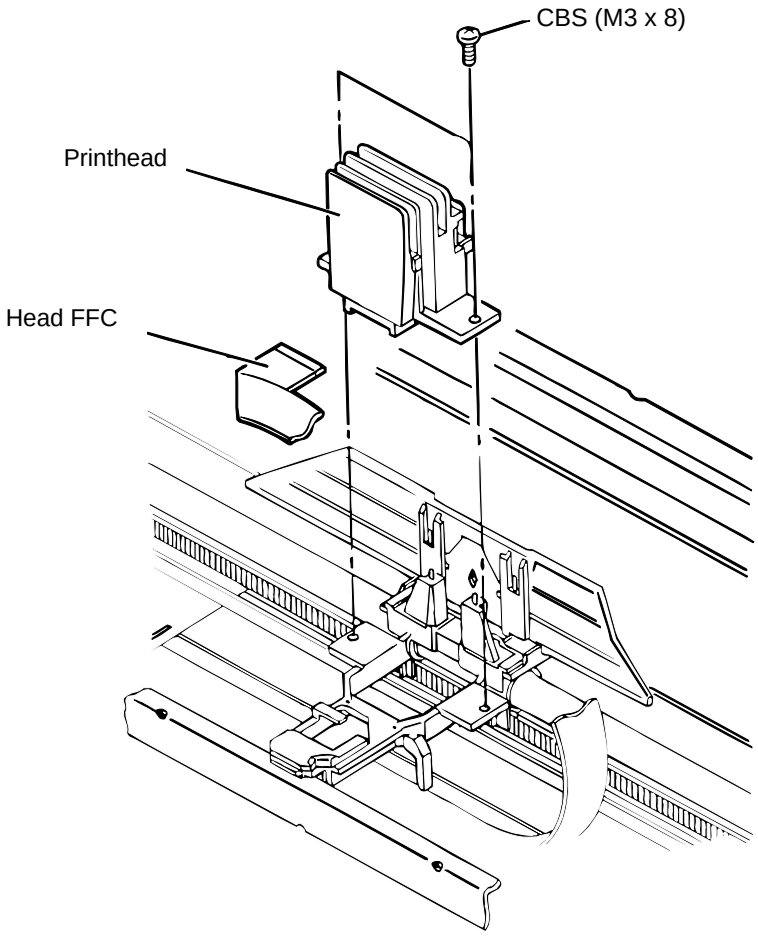


Figure 3-2. Printhead Removal

HP (Home Position) Sensor Removal

1. Remove the top cover.
2. Release the hook securing the HP sensor to the printer.
3. Disconnect the cable from the sensor and remove the sensor.

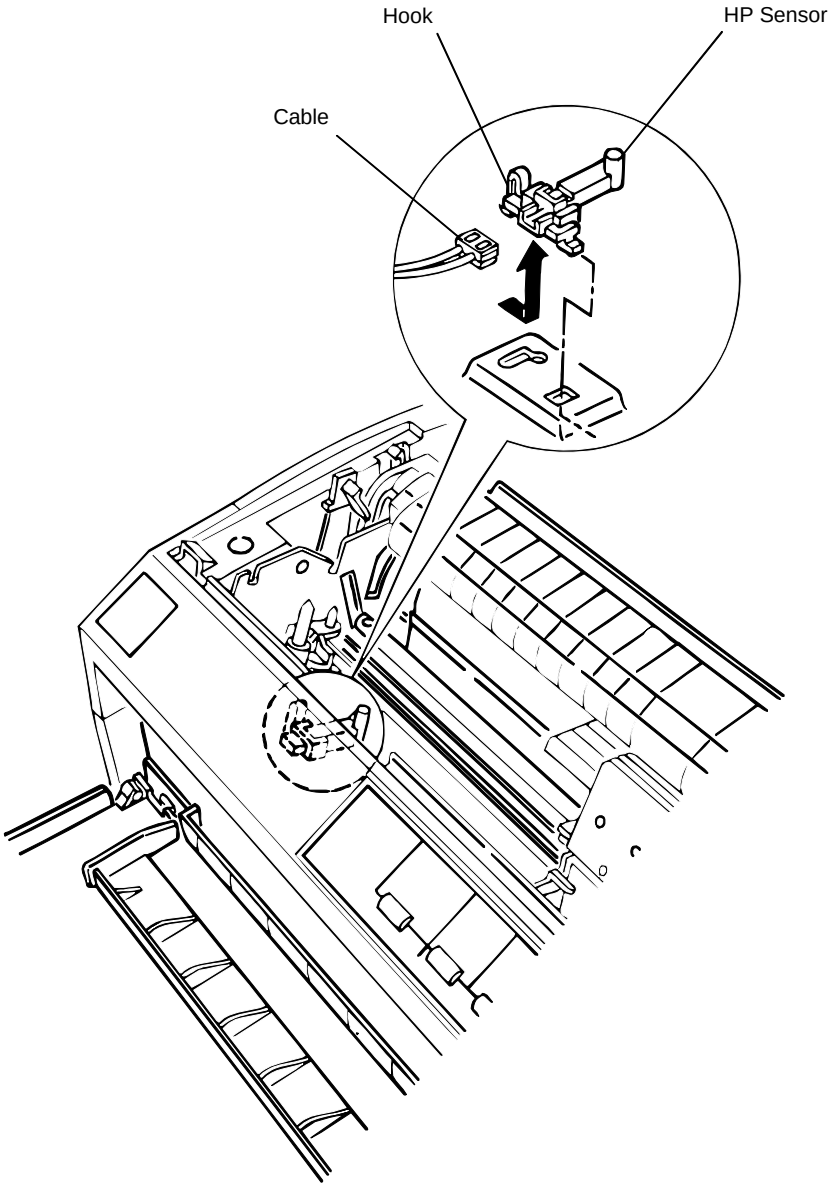


Figure 3-3. HP Sensor Removal

Disassembly Preparation

1. Remove the paper guide, top cover, front cover, and knob. Remove the tractor and paper eject cover by pushing the tabs on each end.

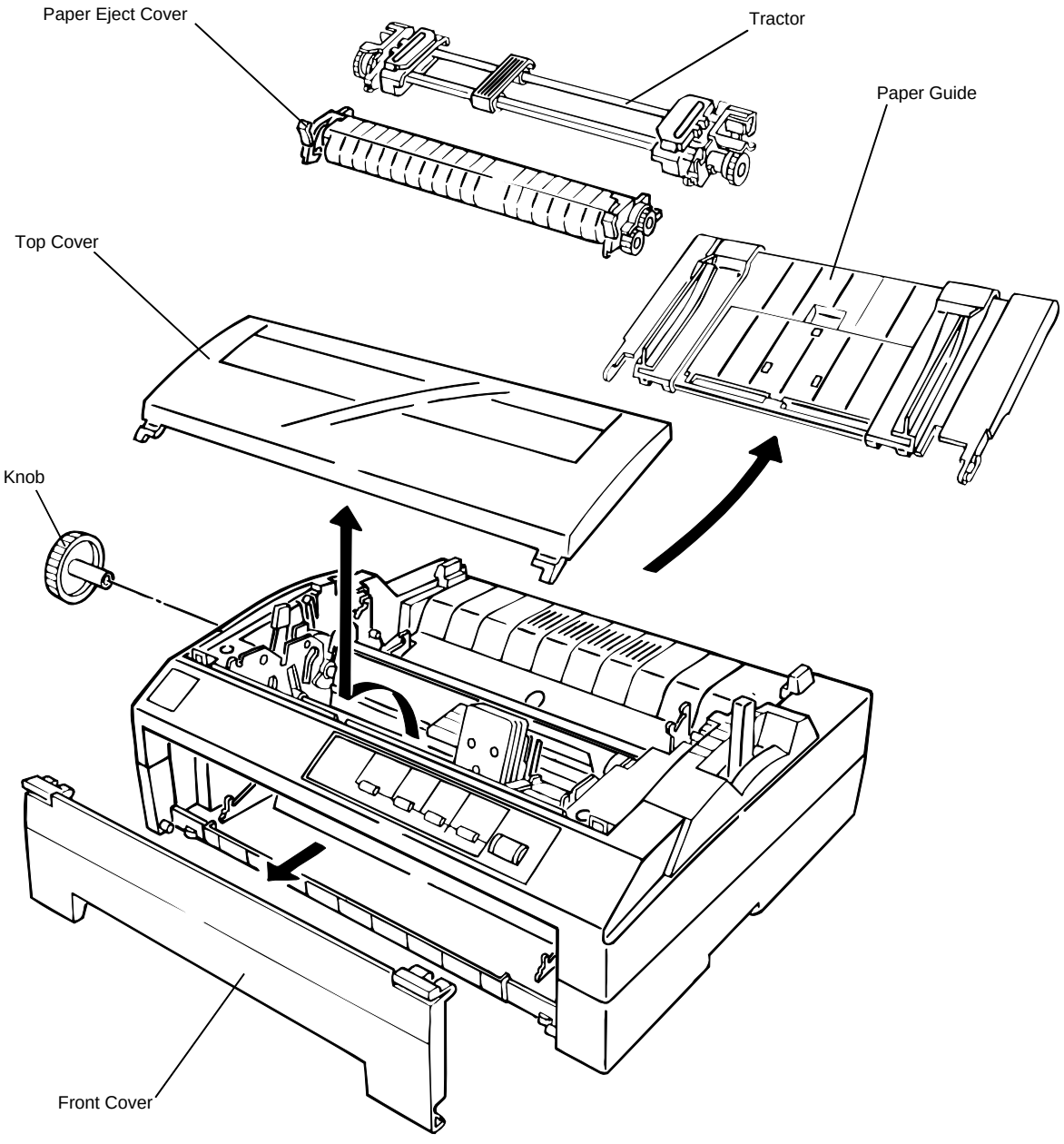


Figure 3-4. Disassembly Preparation

Upper Housing Removal

1. Follow the disassembly preparation procedures (see page 3-8).
2. Remove the 2 CBS (M3 × 6) screws and a CBB (4 × 12) screw securing the upper housing to the lower case. See Figure 3-5.
3. Set the release lever to the friction feed position.
4. Lift the front of the upper housing and disconnect the control panel FFC from the control panel connector.
5. Release the 2 hooks securing the control panel to the bottom-front of the upper housing, and remove the control panel.
6. Lift the upper housing by the front and remove it.

During re-assembly, note the following points:

- When replacing the upper housing, seat the hooks on the upper housing in the corresponding holes in the rear of the lower housing; then close the housing.
- The release lever collar can be replaced after the upper housing has already been installed.

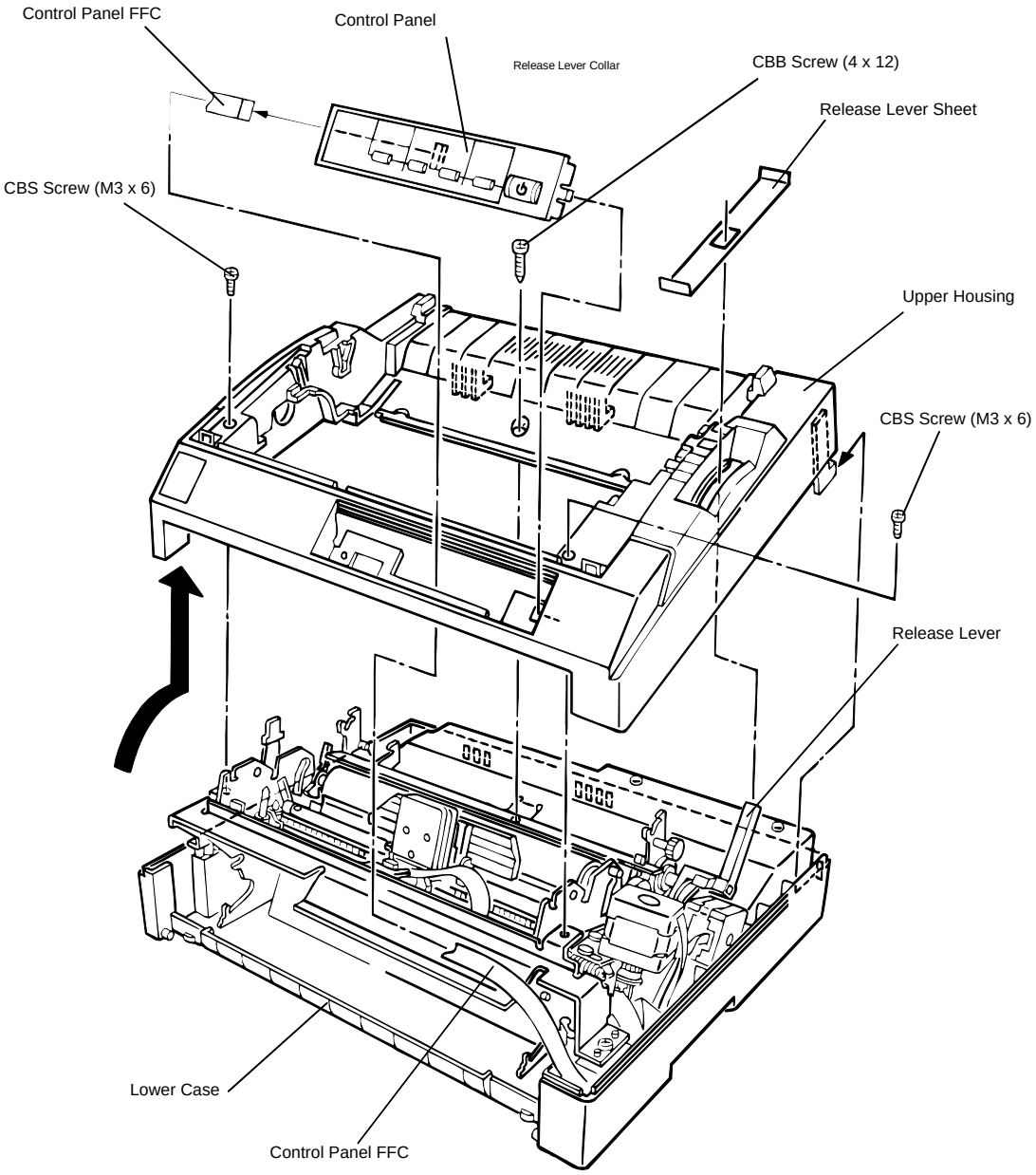


Figure 3-5. Upper Housing Removal

C229 Main Board Removal

1. Follow the disassembly preparation procedure (see page 3-8).
2. Remove the upper housing (see page 3-9).
3. Remove the 5 CBS (M3 × 4) screws and 3 CBB (3 × 12) screws securing the shield cover to the printer mechanism and lower housing; then remove the shield cover. See Figure 3-6.
4. Remove the connector cables from CN3, CN4, CN5, CN6, CN7, CN8, CN9, CN10, CN11, and CN12 on the C229 main board.

   Note: Most of the cables are easily removed by pulling them straight up and out of their sockets. However, with CN3, CN8, and CN9, you must first raise the head of the connector socket. To do this, grasp the two small tabs on each end of the socket's head, and pull straight up. Then pull out the cable.
5. Remove the 2 CBS (M3 × 12) screws securing the upper interface cover to the upper interface grounding plate, then remove the grounding plate.
6. Remove the remaining 5 CBB (3 × 12) screws that secure the C229 main board to the lower case.
7. Remove the interface board guide.
8. Remove the 2 CP (M3 × 8) screws securing the lower interface grounding plate to the parallel interface on the C229 main board, then remove the lower interface grounding plate.
9. Remove the C229 main board.

⚠ WARNING

- *The edges of the shield plate are very sharp.*

⚠ CAUTION

- *Be sure to match the connectors to the correct cables by color – blue to blue, yellow to yellow, etc.*
- *The red wire on the cables for CN3, CN8 and CN9 must be in the Pin No. 1 position.*
- *After replacing the main board, perform the Default Setting and Bi-d Adjustments to write the new settings to the EEPROM (see Chapter 4).*

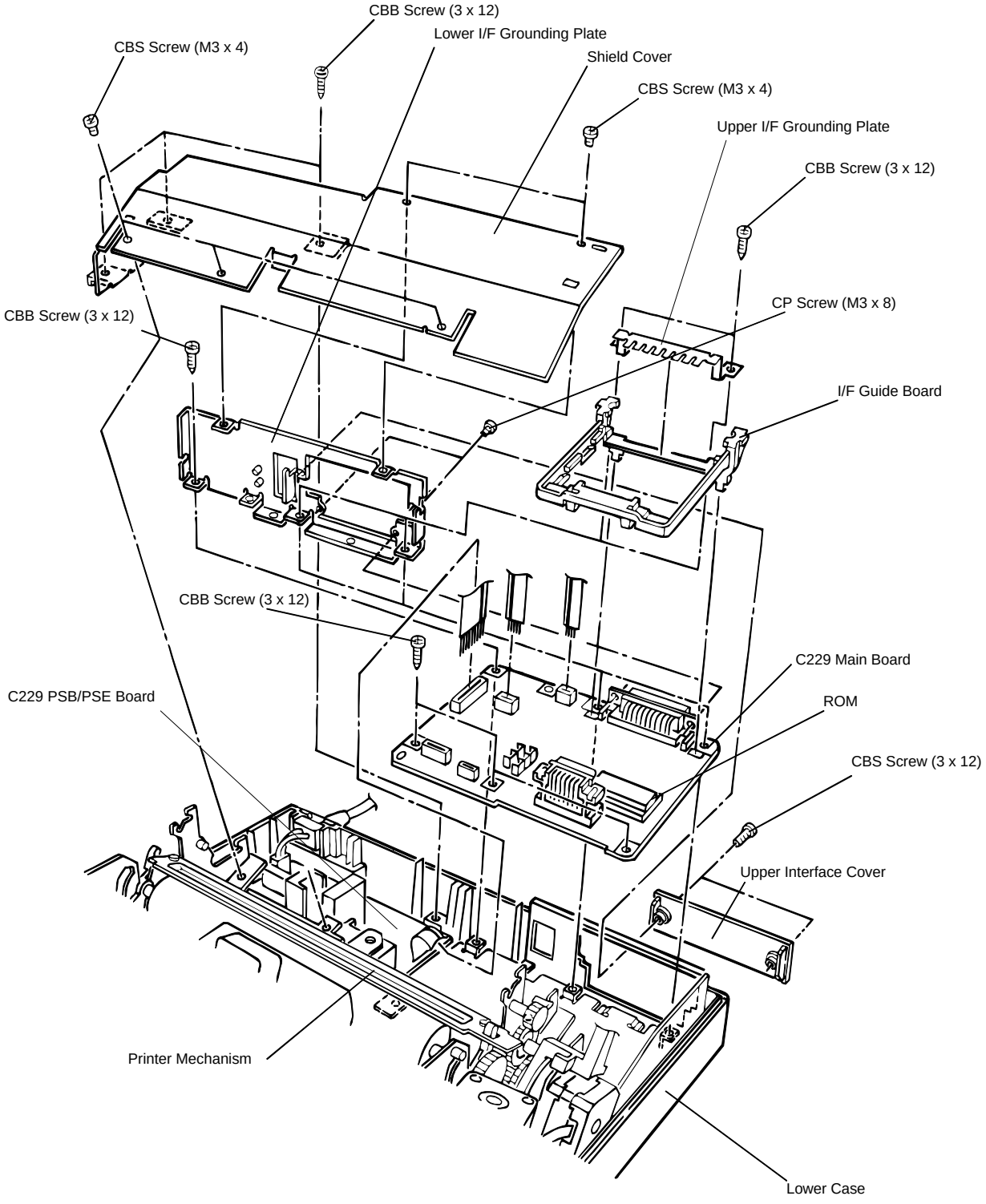


Figure 3-6. Main Board Removal

C229 PSB/PSE Board Removal

⚠ WARNING

- ❑ The primary parts of the power supply are connected to the main power line. Unplug the printer before servicing, and wait at least 5 minutes for the filter capacitor to discharge.
- ❑ The heat sink is *not* electrically isolated from the main power line. Never touch the heat sink while the printer is plugged in.
- ❑ The heat sink gets very hot during operation. Avoid touching the heat sink for at least 5 minutes after unplugging the printer.

1. Follow the disassembly preparation procedure (see page 3-8).
2. Remove the upper housing (see page 3-9).
3. Remove the 5 CBS (M3 × 4) screws and 3 CBB (3 × 12) screws securing the shield cover to the printer mechanism and lower housing, then remove the shield cover (see page 3-11).
4. Disconnect the connector cable from CN3 on the C229 main board.
5. Disconnect the power cable connector from CN1 on the C229 PSB/PSE board. See Figure 3-7.

   Note: To remove the connector, squeeze the latch on the top part of the connector between your thumb and forefinger. While holding the circuit board down with your other hand, pull the connector up and off.
6. Remove the 1 remaining CBB (3 × 12) screw on the C229 PSB/PSE board.
7. Use the Extractor to remove the rivet from the C229 PSB/PSE board.

   Note: To remove the rivet, center the Extractor on top of the rivet and push down to force the Extractor's teeth under the head of the rivet. Then remove the rivet with a pull-and-twist motion.

   When re-installing the power supply board, use a CBB (3 × 12) screw in place of the rivet.

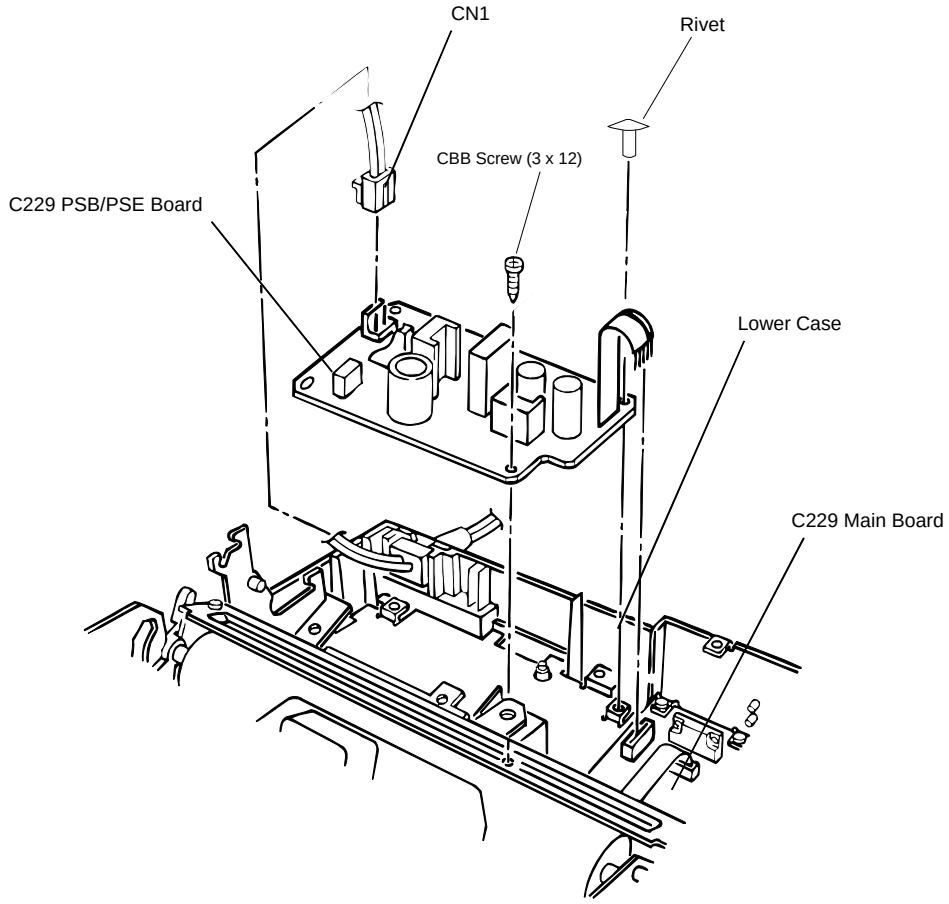


Figure 3-7. Power Supply Board Removal

ROM Removal

1. Follow the disassembly preparation procedures (see page 3-8).
2. Remove the upper housing (see page 3-9).
3. Remove the 5 CBS (M3 × 4) screws and 3 CBB (3 × 12) screws securing the shield cover to the printer mechanism and lower housing, then remove the shield cover (see page 3-11).
4. Remove the ROM from the C229 main board.

Platen Removal

1. Follow the disassembly preparation procedure (see page 3-8).
2. Remove the upper housing (see page 3-9).
3. Remove the 2 CBS (M3 × 8) screws securing the platen cover. See Figure 3-8.
4. Rotate the platen shaft holders on either end of the platen until the tabs on the holders line up with the cutouts on the two side frames.
5. Slide the platen slightly to the right, then lift up to remove it.

⚠ CAUTION

When replacing the platen, perform the platen gap adjustment (see Chapter 4).

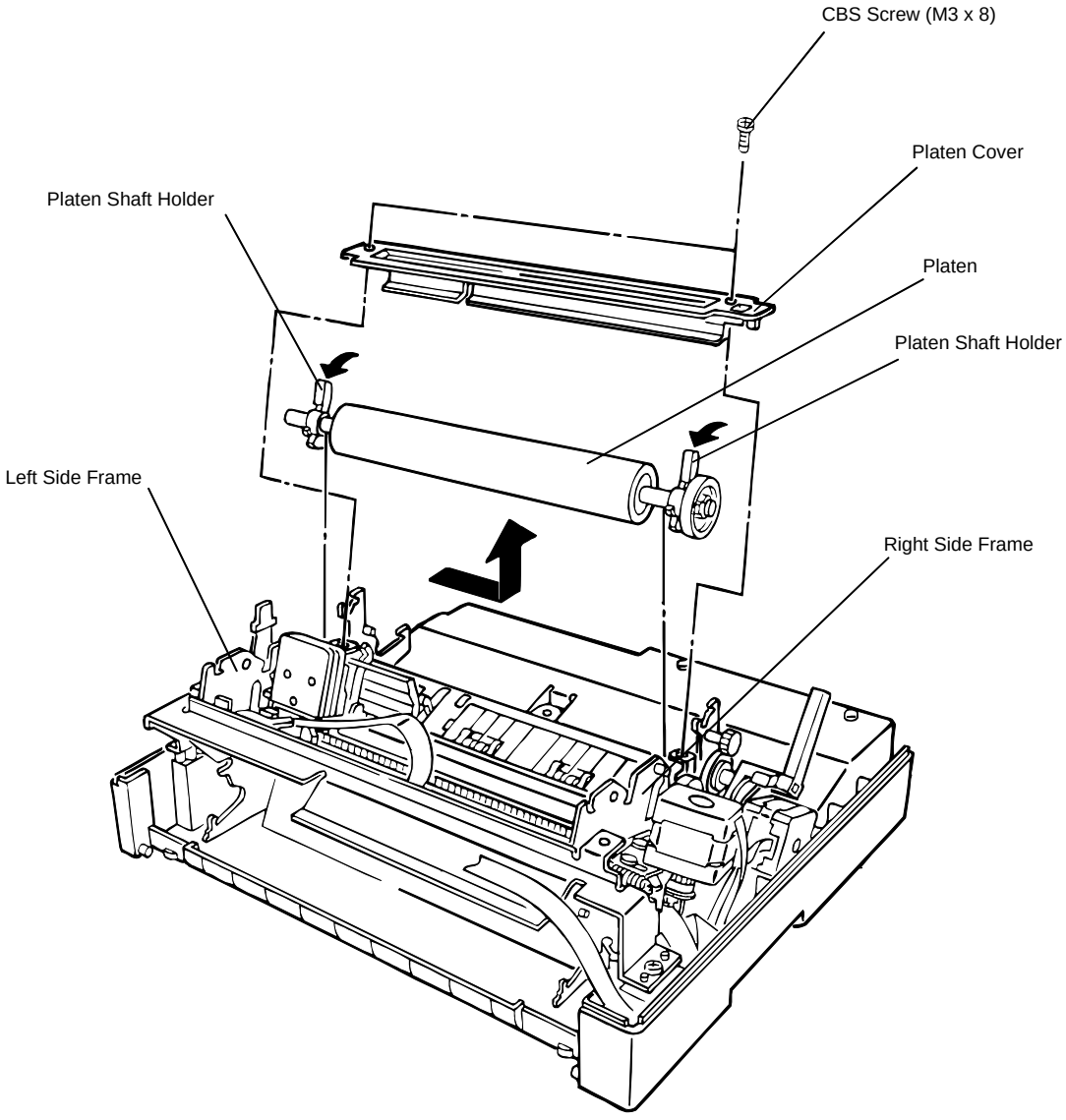


Figure 3-8. Platen Removal

Printer Mechanism Removal

1. Follow the disassembly preparation procedure (see page 3-8).

2. Remove the upper housing (see page 3-9).

3. Remove the 5 CBS (M3 × 4) screws and 3 CBB (3 × 12) screws securing the shield cover to the printer mechanism and lower housing, then remove the shield cover (see page 3-11).

4. Disconnect the connector cables from CN3, CN4, CN5, CN6, CN7, CN8, CN9, CN10 and CN11 on the C229 main board.

5. Remove the 2 CBB (4 × 12) screws securing the front frame to the lower housing, then remove the front frame. See Figure 3-9.

6. Remove the 4 printer mechanism mounting screws, then lift the printer mechanism out to remove it.

⚠CAUTION

After replacing the printer mechanism, perform the platen gap and Bi-d adjustments (see Chapter 4).

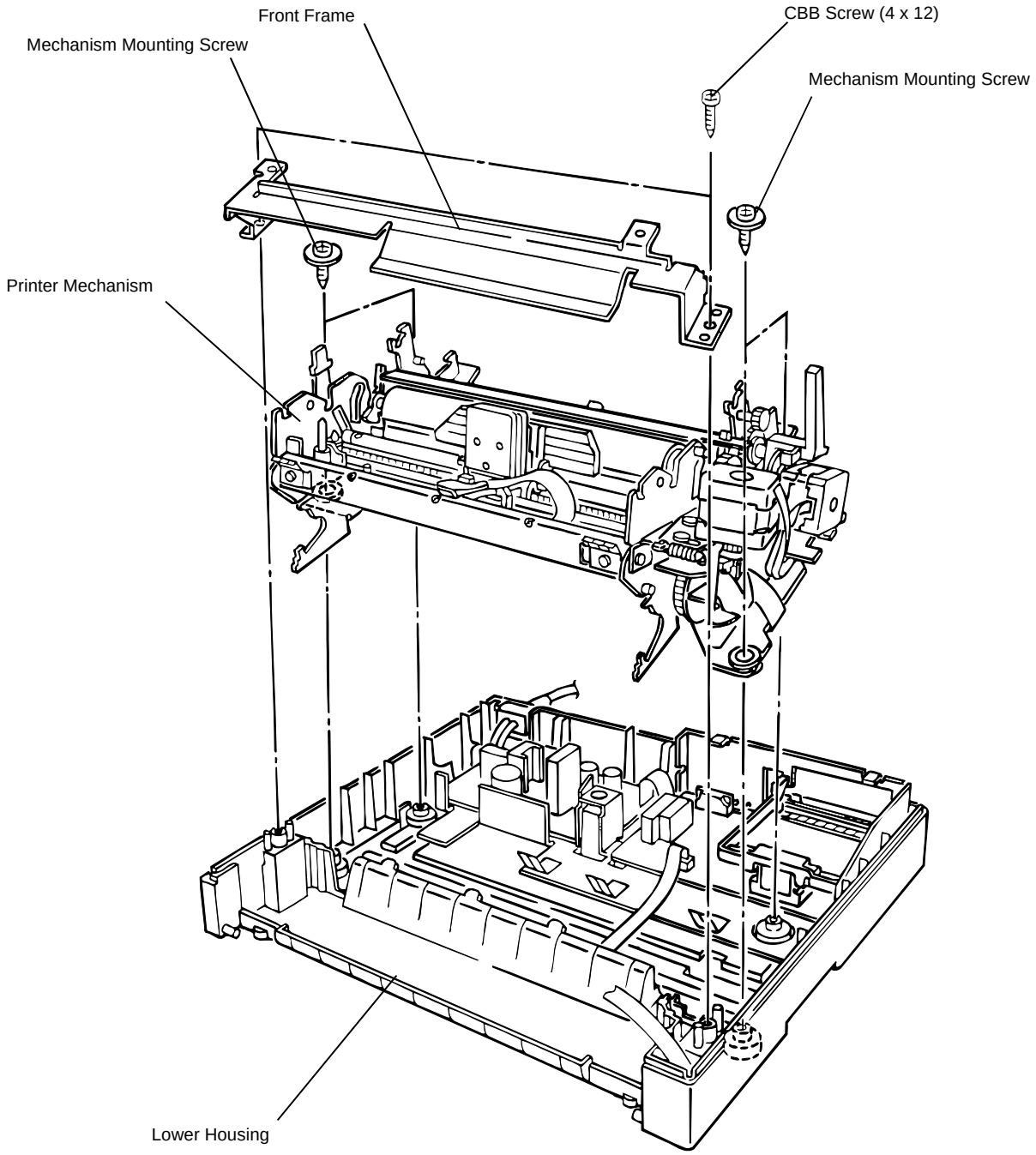


Figure 3-9. Printer Mechanism Removal

Printer Mechanism Disassembly

CR Motor Removal

1. Remove the printer mechanism (see page 3-17).
2. Release the tension spring.
3. Disengage the timing belt from the CR motor pinion and hang it on the nearby hook.
4. Remove the 2 carriage mounting screws securing the CR motor assembly to the right subframe, then remove the CR motor.
5. Remove the 2 CB (M3 × 6) screws securing the CR motor to the motor bracket, then remove the CR motor.

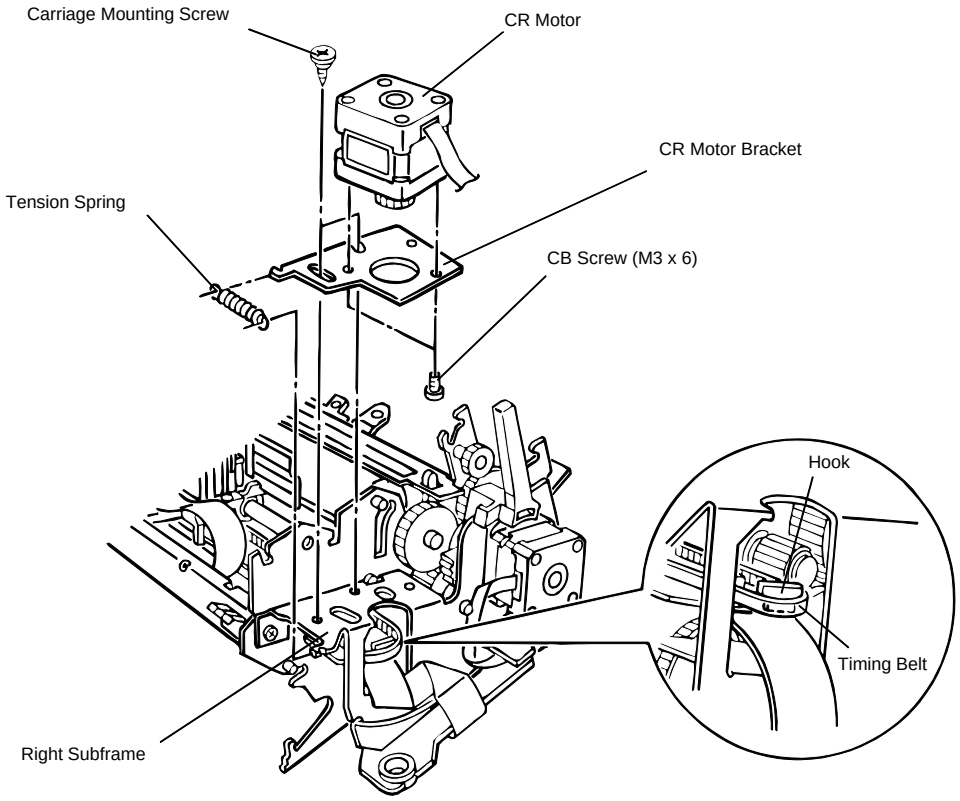


Figure 3-10. CR Motor Removal

When reassembling the CR motor, position it on the bracket as shown below:

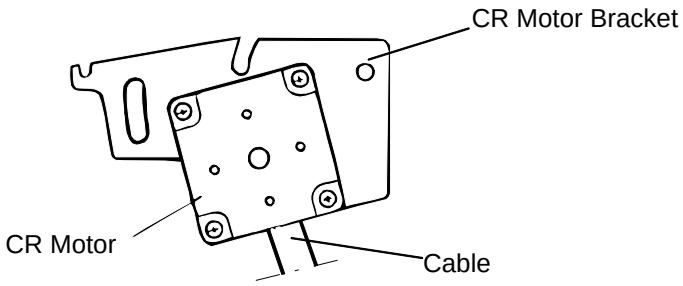


Figure 3-11. Positioning the CR Motor on its Bracket

⚠CAUTION

After replacing the CR motor or timing belt, perform the Bi-d adjustment (see Chapter 4).

PF Motor Removal

1. Remove the printer mechanism (see page 3-17).
2. Release the motor cable from the printer mechanism.
3. Set the release lever to the tractor feed position (forward).
4. Remove the 2 CBS (M3 × 8) screws securing the PF motor to the right sub frame, then remove the PF motor.

⚠ CAUTION

If the release lever is in the friction feeding position, the PF motor cannot be removed.

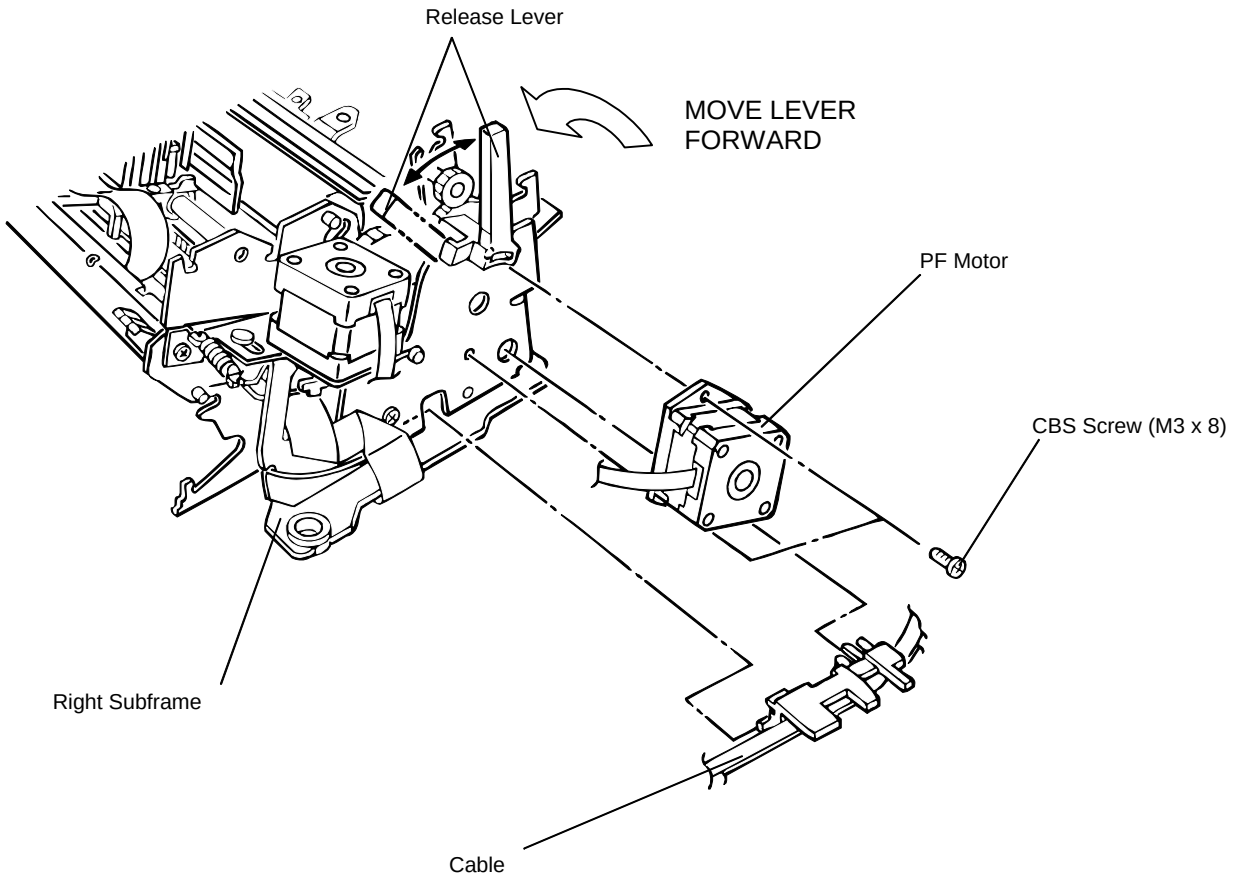


Figure 3-12. PF Motor Removal

PF Gear Train Disassembly

1. Remove the printer mechanism (see page 3-17).
2. Remove the CR motor (see page 3-19).
3. Remove the PF motor (see page 3-21).
4. Remove the head FFC from the right subframe of the printer mechanism.
5. Remove the 2 CBS (M3 × 8) screws securing the right subframe, then remove the right subframe.
6. Remove the gears.

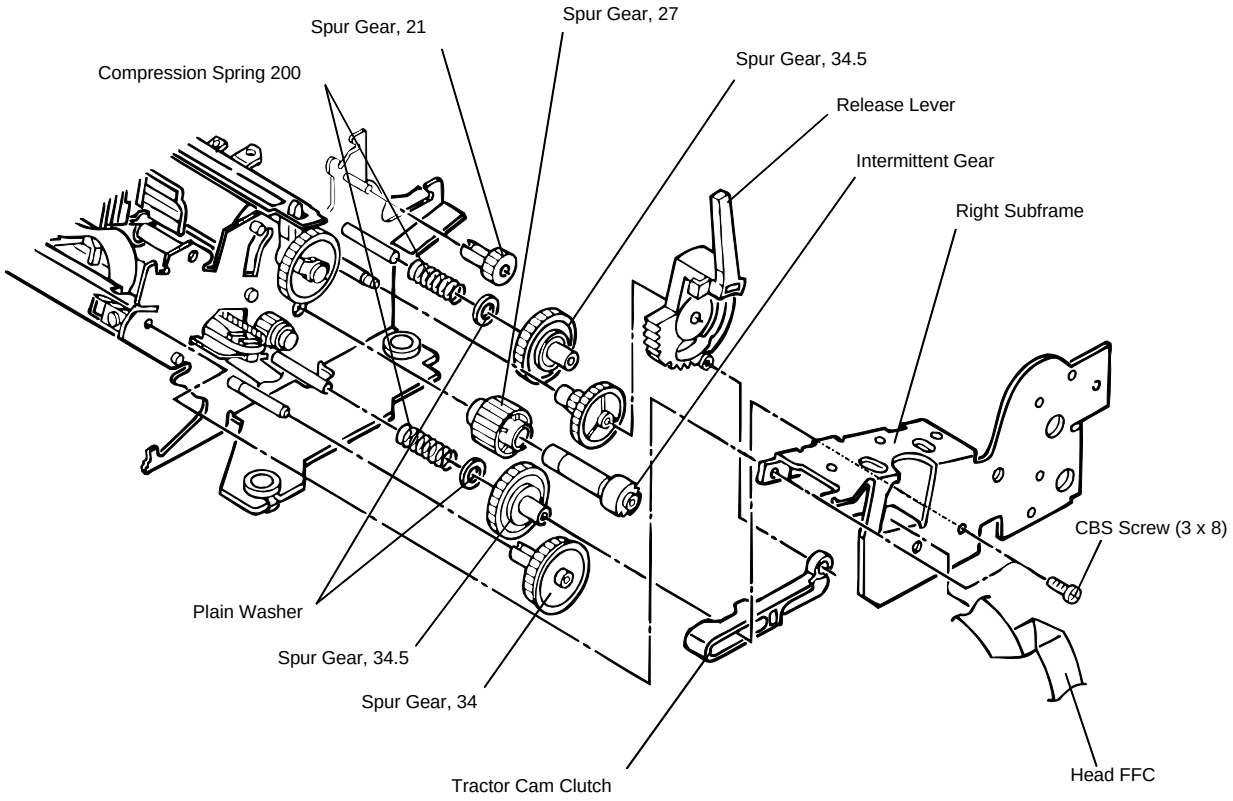


Figure 3-13. PF Gear Train Disassembly

⚠CAUTION

- *When assembling, engage the hole in the tractor cam clutch with the lower tab of the release lever.*
- *Be sure to properly match the release lever with the teeth of the intermittent gear, as shown below.*

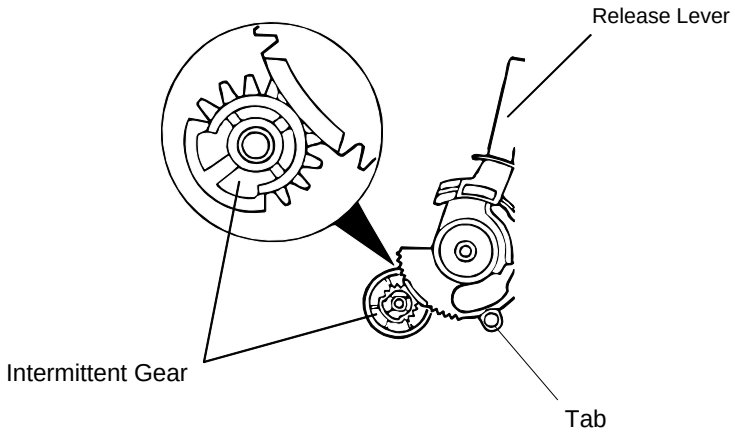


Figure 3-14. Release Lever and Intermittent Gear

PG (Platen Gap) Sensor Removal

1. Remove the printer mechanism (see page 3-17).
2. Release the 2 hooks securing the PG sensor to the left frame of the printer mechanism.
3. Disconnect the cable from the sensor and remove the sensor.

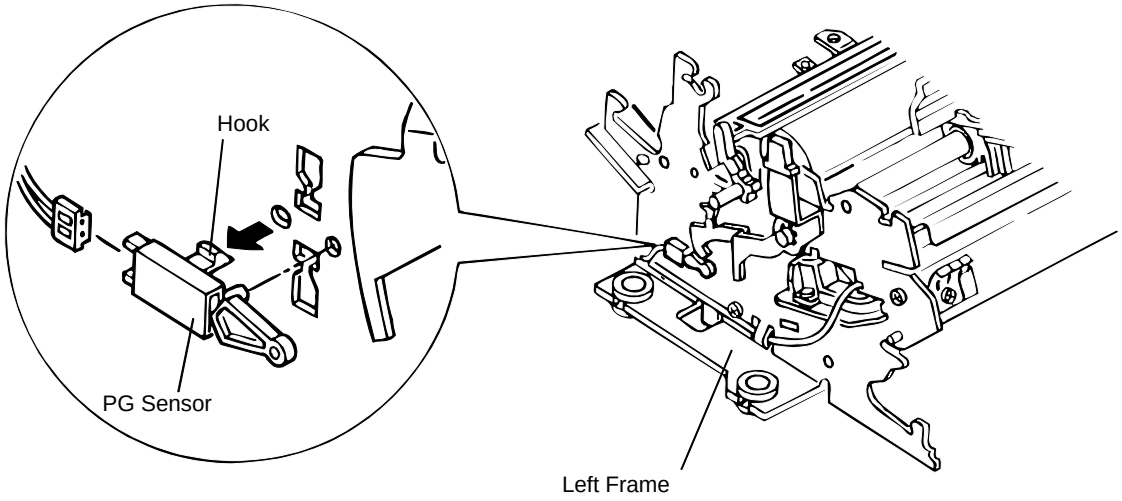


Figure 3-15. PG Sensor Removal

Release Lever Sensor Removal

1. Remove the printer mechanism (see page 3-17).
2. Release the 2 hooks securing the release lever sensor to the right subframe of the printer mechanism.
3. Disconnect the cable from the sensor and remove the sensor.

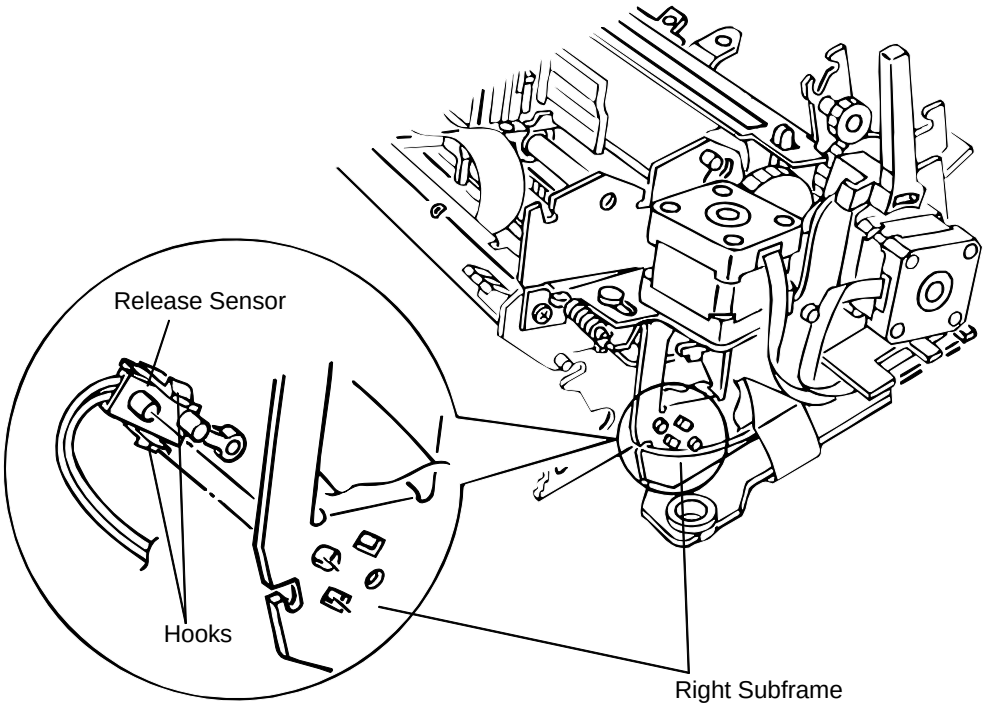


Figure 3-16. Release Lever Sensor Removal

Front PE (Paper End) Sensor Removal

1. Remove the printer mechanism (see page 3-17).
2. Release the 2 hooks securing the front PE sensor to the rear paper guide.
3. Disconnect the cable from the sensor, then remove the sensor.

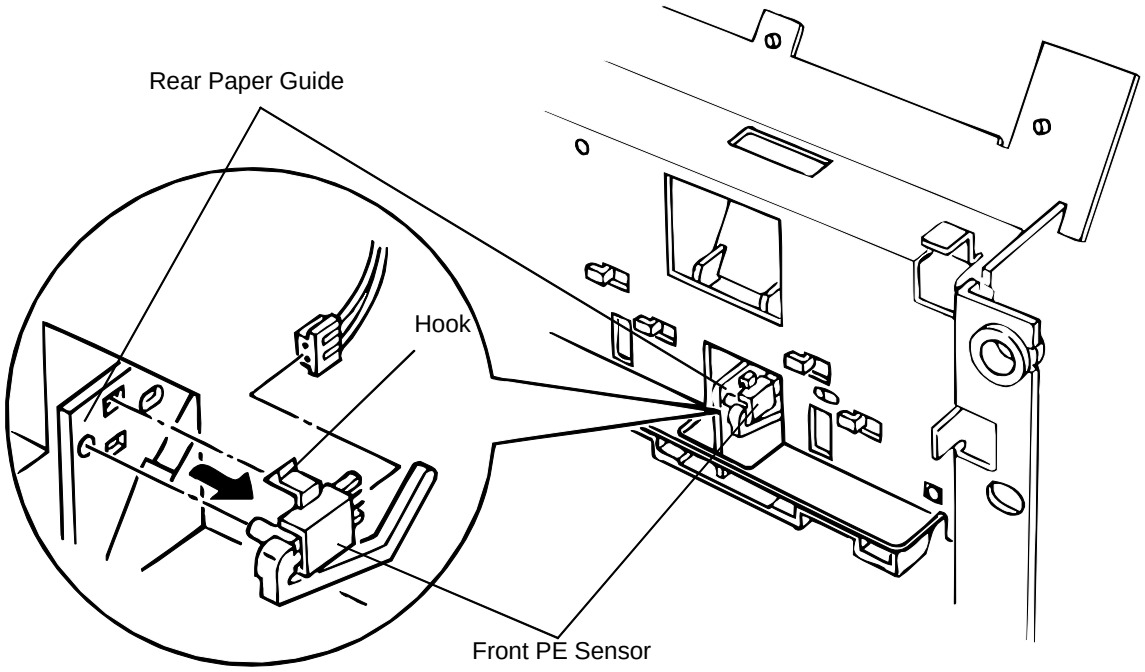


Figure 3-17. Front PE Sensor Removal

Rear PE Sensor Removal

1. Remove the printer mechanism (see page 3-17).
2. Carefully stand the printer mechanism on end.
3. Release the 2 hooks securing the rear PE sensor to the rear paper guide.
4. Release the 2 hooks attaching the rear paper guide to the sensor, slide the sensor to the rear, and pull down to remove it.
5. Disconnect the cable from the sensor.

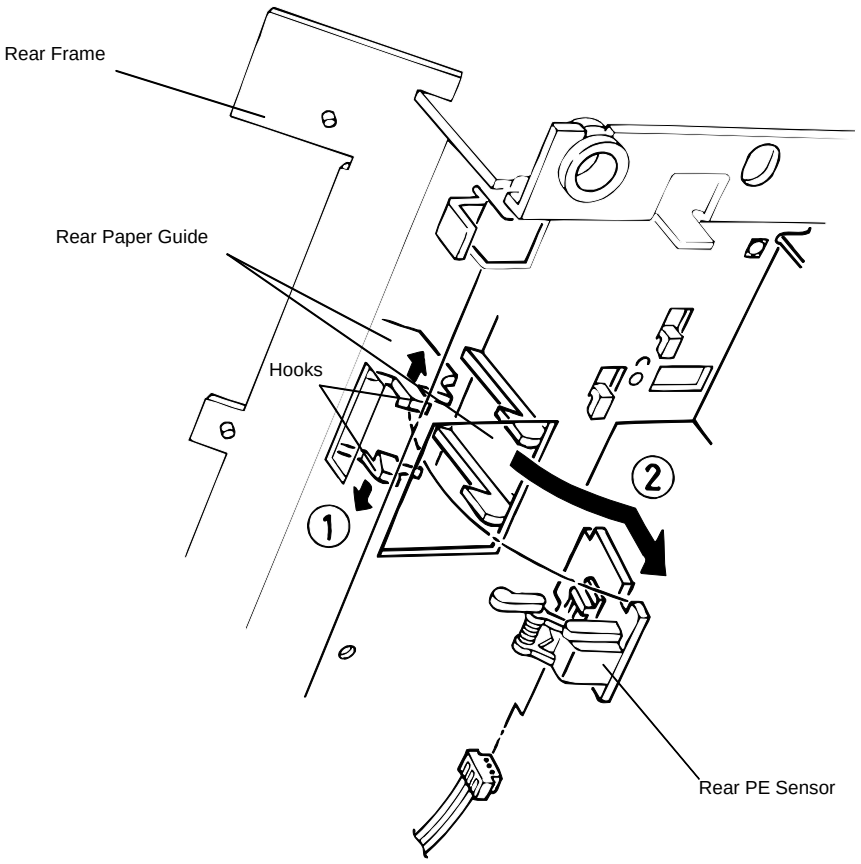


Figure 3-18. Rear PE Sensor Removal

Carriage Removal

1. Remove the printer mechanism (see page 3-17).
2. Remove the printhead FFC (see page 3-6).
3. Remove the platen (see page 3-15).
4. Remove the hexagon nut and washer securing the release lever to the CR guide shaft, then remove the lever.
5. Remove the parallel adjustment bushing from the CR guide shaft.
6. Disengage the timing belt from the CR motor (see page 3-19).
7. Move the carriage to the far-right end of the CR guide shaft, and remove both the carriage and CR guide shaft by lifting them from the front frame.
8. Release the timing belt from the 2 clips at the bottom of the carriage assembly.

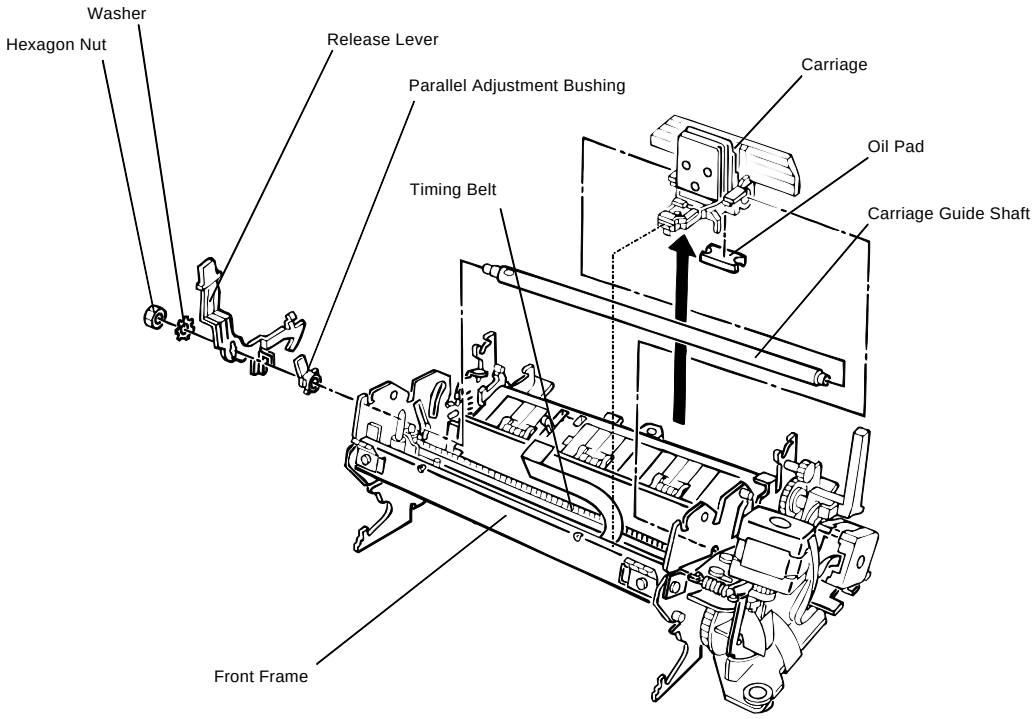


Figure 3-19. Carriage Removal

⚠CAUTION

After replacing the carriage, perform the platen gap adjustment (see Chapter 4).

⚠CAUTION

When attaching the timing belt to the carriage, secure the timing belt to the left and right clips of the carriage assembly as shown below. Make sure there is no slack in the timing belt.

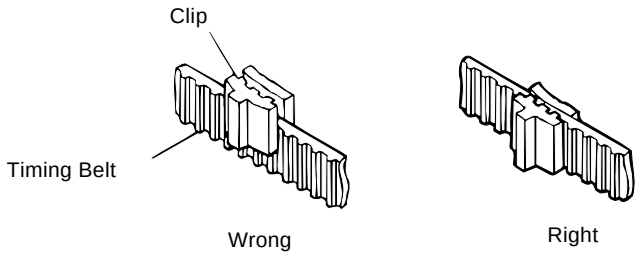


Figure 3-20. Attaching the Timing Belt

Rear Paper Guide Removal

1. Remove the printer mechanism (see page 3-17).
2. Remove the platen (see page 3-15).
3. Remove the hexagon nut and the washer securing the adjust lever to the CR guide shaft, then remove the lever. See Figure 3-21.
4. Remove the parallel adjustment bushing from the CR guide shaft (see page 3-28).
5. Remove the PG sensor (see page 3-24).
6. Remove the cable from the HP sensor.
7. Remove the 4 CBS (M3 × 8) screws securing the left frame of the printer mechanism, then remove the left frame. See Figure 3-21.
8. Remove the printhead FFC from the rear frame of the printer mechanism.
9. Remove the 2 CBS (M3 × 8) screws securing the rear frame to the right frame.
10. Push the hook on the bottom of the rear paper guide, then slide the rear paper guide out from the rear frame.

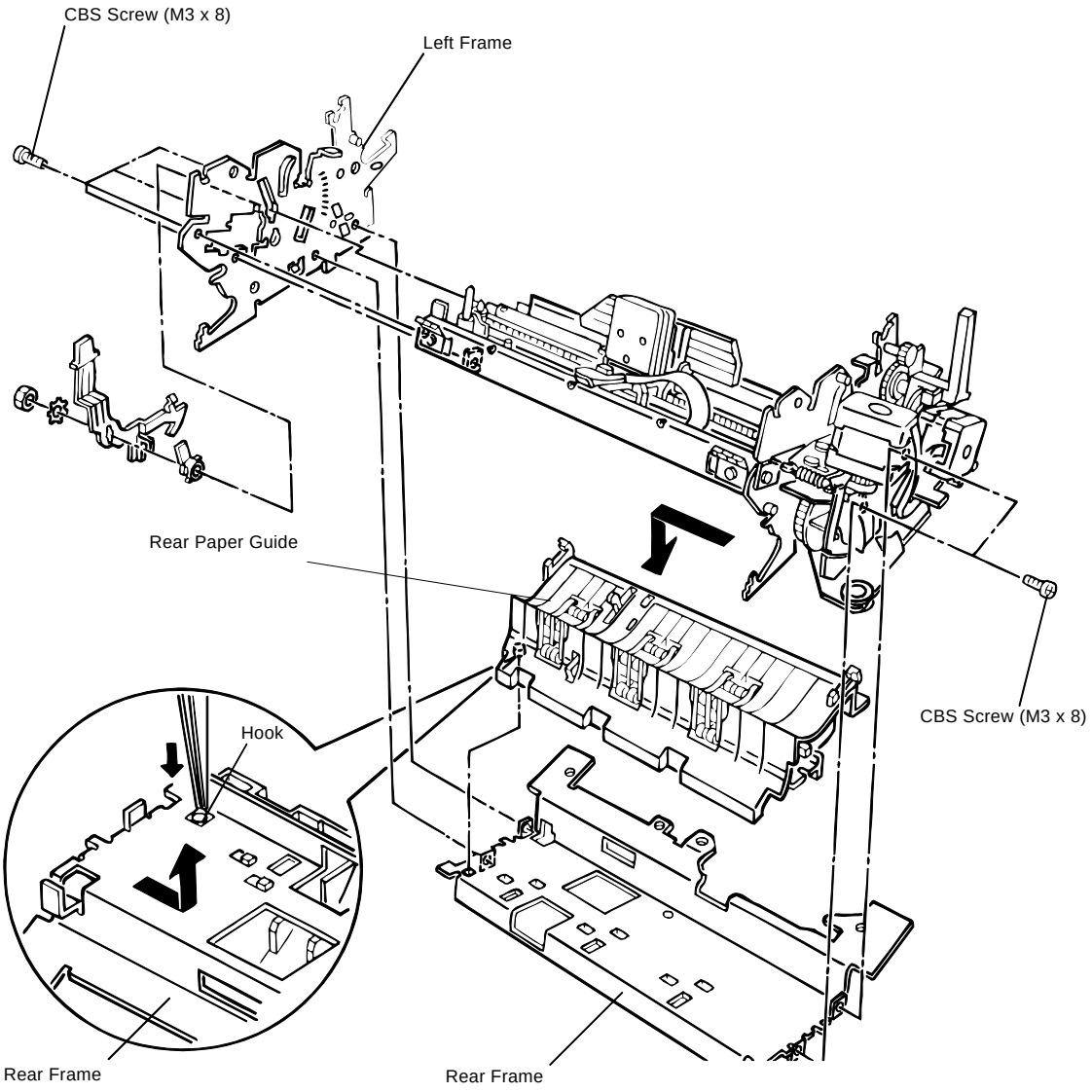


Figure 3-21. Rear Paper Guide Removal

Ribbon Drive Removal

1. Remove the printer mechanism (see page 3-17).
2. Remove the platen (see page 3-15).
3. Remove the hexagon nut and the washer securing the adjust lever to the CR guide shaft, then remove the lever.
4. Remove the parallel adjustment bushing from the CR guide shaft. (see page 3-28)
5. Remove the PG sensor cable (see page 3-24).
6. Remove the HP sensor cable from the left frame.
7. Remove the 4 CBS (M3 × 8) screws securing the left frame, then remove the left frame.
8. Remove the CBC (M3 × 8) screw and the CBB (3 × 8) screw securing the ribbon drive.
9. Release the ribbon drive from the roller drive, then remove the ribbon drive.

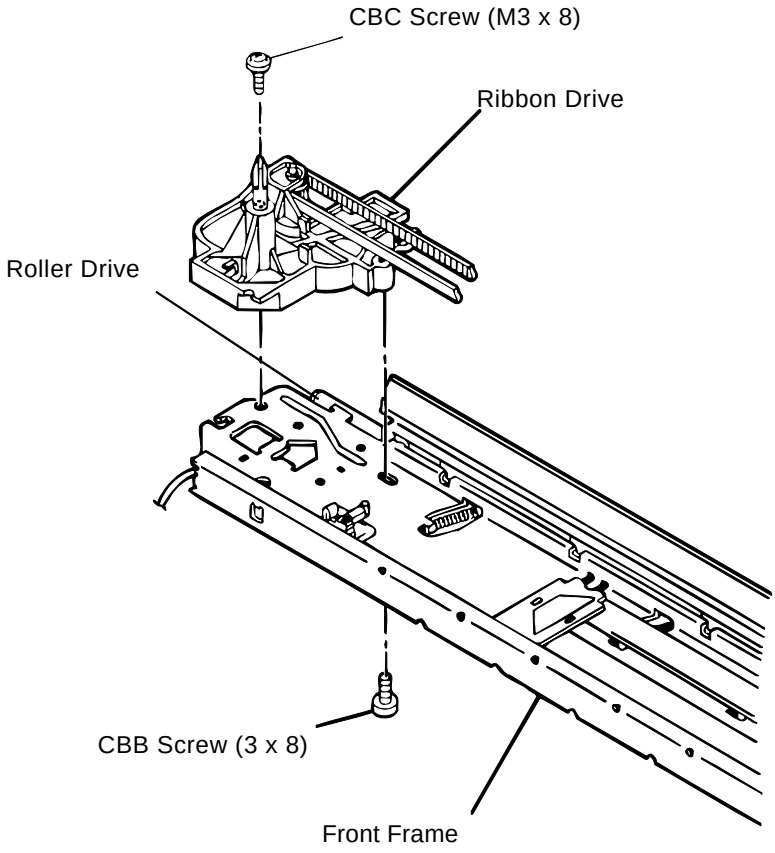


Figure 3-22. Ribbon Drive Removal

4. Adjustments

Adjustment Overview 4-1
Required Adjustments 4-1
Adjustment Tools 4-1

Adjusting and Resetting the Printer 4-2
Platen Gap Adjustment 4-2
Factory Settings 4-4
Bidirectional Adjustment 4-6

Adjustment Overview

Required Adjustments

Whenever you remove or replace parts, you must perform certain adjustments. The required adjustments are shown in Table 4-1 according to the type of repair performed.

Table 4-1. Required Adjustments

Repair Procedure	Platen Gap	Factory Settings	Bi-D Print Alignment
Printhead removal or replacement	⊗	—	⊗
Printer mechanism replacement	—	—	⊗
Printer mechanism removal	⊗	—	⊗
Main board replacement	—	⊗	⊗
Timing belt replacement	⊗	—	⊗
Platen replacement	⊗	—	—
Carriage assembly replacement	⊗	—	⊗
CR motor replacement	—	—	⊗
EEPROM initialization	—	—	⊗

Notes:
⊗ *means the adjustment is required.*
— *means the adjustment is not required.*

Adjustment Tools

The following table shows the tools required for each adjustment.

Table 4-2. Required Adjustment Tools

Adjustment	Required Tool
Platen gap	Thickness gauge
Factory settings	Adjustment program diskette
Bi-D print alignment	Adjustment program diskette

Adjusting and Resetting the Printer

Platen Gap Adjustment

If the CR guide shaft has been removed, or if the parallelism adjustment bushing has been rotated, you must perform the platen gap adjustment. Symptoms of a mis-adjusted platen gap include faint printing (if the gap is too wide), or smudge marks appearing on the page (if the gap is too narrow). If any of these symptoms appear, you must perform the platen gap adjustment.

1. Remove the upper housing as described in Chapter 3, *Disassembly and Assembly*.
2. Remove the printhead from the carriage assembly as described in Chapter 3.
3. Using tweezers, remove the ribbon mask from the carriage assembly.

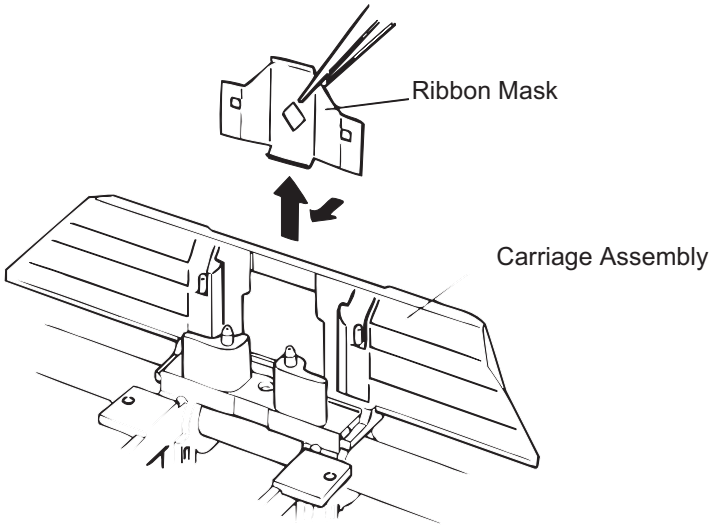


Figure 4-1. Ribbon Mask Removal

4. Re-install the printhead on the carriage assembly.
5. Set the paper adjustment lever to “0” (the second step position from the rear).
6. Rotate the CR guide shaft so that the large countersunk hole on the left edge of the shaft faces upward.

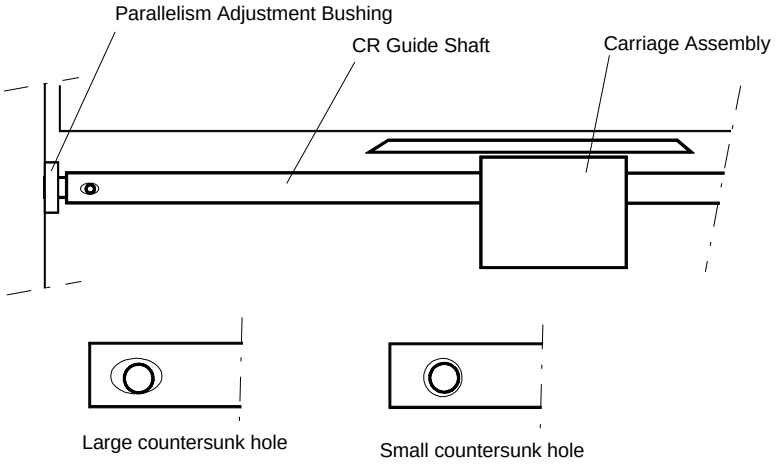


Figure 4-2. Setting CR Guide Shaft

7. Move the carriage assembly to the right edge.
8. Slightly loosen the hexagonal nut securing the PG adjust lever and the CR guide shaft.
9. Set the thickness gauge to 0.38 mm and insert it between the printhead and platen.
10. Insert a screwdriver into the countersunk hole located on the left side of the CR guide shaft and turn the screwdriver until the platen and the printhead touch each other lightly.
11. Move the carriage assembly to the left edge.
12. Insert the thickness gauge (0.38 mm) between the printhead and platen.
13. Insert the screwdriver into the countersunk hole and turn the screwdriver until the platen and printhead touch each other lightly.
14. Continue performing adjustment steps 10 through 13, rotating the parallelism adjustment bushing until the parallelism gap is correct on each end. The difference between the right and left gaps should be less than 0.02 mm.
15. Move the carriage assembly to the center of the printable area.
16. Insert the thickness gauge between the printhead and the platen, and rotate the CR guide shaft until the platen gap is 0.365 ± 0.015 mm.

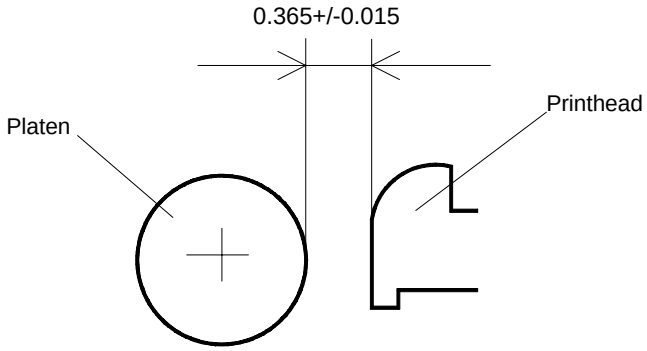


Figure 4-3. Platen Gap

17. When the adjustment is complete, re-tighten the hexagonal nut on the PG adjust lever.
18. Remove the printhead and install the ribbon mask.
19. Re-install the printhead in the carriage assembly.

⚠CAUTION

Do not rotate the platen during adjustment.

Factory Settings

The printer's factory settings are stored in the EEPROM on the main board. Therefore, if you replace the main board, you must restore the settings using the adjustment program.

⚠CAUTION

- *When using the adjustment program, do not select any options that are not described in this manual. The adjustment program is the same as the check program used in the factory and includes many options that are not needed for service. If you select options other than those indicated in this manual, the printer may go into an error state and need to be reset.*
- *The new factory settings are saved only after printing a test pattern, as described in the instructions below. Do not turn the printer off or exit the adjustment program until you have first printed a test pattern.*

1. Connect the printer to the host computer with a parallel interface cable.
2. Place continuous paper in the printer, according to the model indicated below:

   FX-880: 10-inch wide paper
   FX-1180: 15-inch wide paper

3. Run the adjustment program on the host computer.
4. The printhead wire select menu appears. Press ↑ or ↓ to select **9 pins** from the list, and press **Enter**.

```
Program : xxxxxSetting:
          VR 0 = x        VR 1 = x        VR 2 = x
                          **      **
[ Printer setting ]
>(1) 9 pins
  (2) 24 pins
```

5. The market setting menu appears. Referring to Table 4-3, press ↑or ↓ to select your market from the list and press **Enter**. If you need to change your selection, press **Esc** to display the market setting menu again. An example (for EAI) is shown below:

```
Program : xxxxxSetting:
9 pins    VR 0 = x        VR 1 = x        VR 2 = x
                          **      **
[ Setting File ]
  (1)     DEFSTD          (6)     ITALIC
>(2)     USASTD
  (3)     EURSTD
  (4)     NLSP
  (5)     RUSSIAN
```

Table 4-3. Market List

Destination	Code
EAI, EAI (Latin)	USASTD
EURO, EDG, EUL, EUL (SCANDINAVIA), EFS, EIS, EIB	EURSTD
EDG (NLSP)	NLSP
EUL (MIDDLE EAST), EAL, ESP, EHK	DEFSTD

6. The process selection menu appears. Press ↑ or ↓ to select **In line** and press **Enter**.

```
Program : xxxxxSetting:
9 pins   VR 0 = x        VR 1 = x        VR 2 = x
                         **       **
[ Process select ]
>(1) In line
  (2) Out-Going
```

7. The carriage width select menu appears. Press ↑ or ↓ to select a column width for your printer model, and press **Enter**:

   FX-880: 80 columns
   FX-1180: 136 columns

```
Program : xxxxxSetting:
9 pins   VR 0 = x        VR 1 = x        VR 2 = x
                         ** In line**
[ Carriage Width ]
>(1) 80 column
  (2) 106 column
  (3) 136 column
```

8. The main menu appears. Press ↑ or ↓ to select **FF paper** and press **Enter**. The printer starts printing the test pattern.

```
Program : xxxxxSetting:
9 pins   VR 0 = x        VR 1 = x        VR 2 = x
                         ** In line**
[ Main Menu ]
  (1) Bi-D Adjust (6) Envelope
>(2)FF paper          (7) – SUB MENU
  (3) ---- N/A ----
```

9. After the test pattern is printed, turn the printer off to store the factory settings in the EEPROM.
10. Press **Esc** several times to quit the program.

Bidirectional Adjustment

You can perform the bidirectional adjustment with the adjustment program or from the control panel. This section describes how to make the adjustment with the adjustment program. To make the adjustment from the control panel, see "Control Panel Operation" in Chapter 1.

⚠CAUTION

- *When using the adjustment program, do not select any options that are not described in this manual. The adjustment program is the same as the check program used in the factory and includes many options that are not needed for service. If you select options other than those indicated in this manual, the printer may go into an error state and need to be reset.*

1. Follow steps 1 through 7 under "Factory Settings" on page 4-4 to display the main menu, shown below:

```
Program : xxxxxSetting:
9 pins   VR 0 = x        VR 1 = x        VR 2 = x
                         ** In line**
[ Main Menu ]
>(1) Bi-D Adjust (6) Envelope
  (2)FF paper            (7) – SUB MENU
  (3) ---- N/A ----
```

2. Press ↑ or ↓ to select **Bi-D Adjust** and press **Enter**. The printer starts printing the test pattern.
3. The Bi-D adjustment menu appears. Three modes are listed in the menu, and each mode corresponds to a different print speed. To perform the Bi-D adjustment, you must test the printer at all three speeds. Press ↑ or ↓ to select the desired Bi-D printing mode, and press ← or → to change the setting's value.

```
                    < Bi-D Adjustment >

                      > Mode 0 = x
                        Mode 1 = x
                        Mode 4 = x

Cancel  Print          Speed  Value  Write  Default
[ESC]   [SPACE]        [↑ ↓]  [←→]   [RET]  [HOME]
```

4. Press the space bar to print the four-line Bi-D pattern for the current print mode, as shown below.

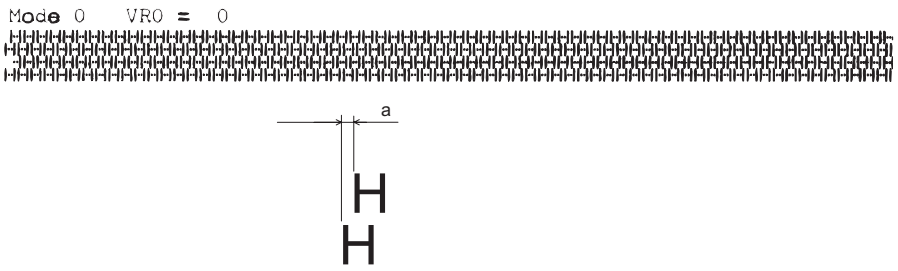


Figure 4-4. Bi-D Adjustment Pattern

5. Repeat steps 3 and 4 until you achieve satisfactory alignment. Alignment is correct when the vertical lines on the H's line up within the margins of error specified below (see **a** on Figure 4-4):

All modes	Less than 0.05 mm (at the center of the test pattern)
Mode 0	Less than 0.3 mm (at the left and right sides of the test pattern)
Mode 1	Less than 0.2 mm (at the left and right sides of the test pattern)
Mode 4	Less than 0.05 mm (at the left and right sides of the test pattern)

6. Press **Enter** to set the adjustment value for each mode.
7. Turn off the printer to store the Bi-D settings in the EEPROM.
8. Press **Esc** several times to quit the program.

5. Troubleshooting

Overview 5-1
- Motors 5-2
  - Motor Drivers 5-3
- Printhead 5-4
  - Printhead Driver 5-5
- Sensors 5-6
- Power Supply 5-6

Unit Level Troubleshooting 5-7
- Flowchart 1 – Printer Does Not Operate at Power-On 5-8
- Flowchart 2 – Abnormal Carriage Operation 5-9
- Flowchart 3 – Problem With Printing During Self-test 5-10
- Flowchart 4 – Printer Does Not Feed the Paper Correctly 5-11
- Flowchart 5 – Abnormal Control Panel Operation 5-12
- Flowchart 6 – Fails to Print from PC 5-13

Repairing the Power Supply Circuit Board 5-14

Repairing the Main Board Assembly 5-17

Repairing the Printer Mechanism 5-21

Overview

This chapter contains flowcharts and checkpoint tables to help you troubleshoot the printer. Use the flowcharts to isolate a faulty unit based on abnormal symptoms. Use the checkpoint tables to identify the faulty part or unit by checking the values or ranges listed for each component.

After completing a repair, perform the appropriate adjustments and any required lubrication. See Chapter 4 for adjustments, and Chapter 6 for information about lubrication points.

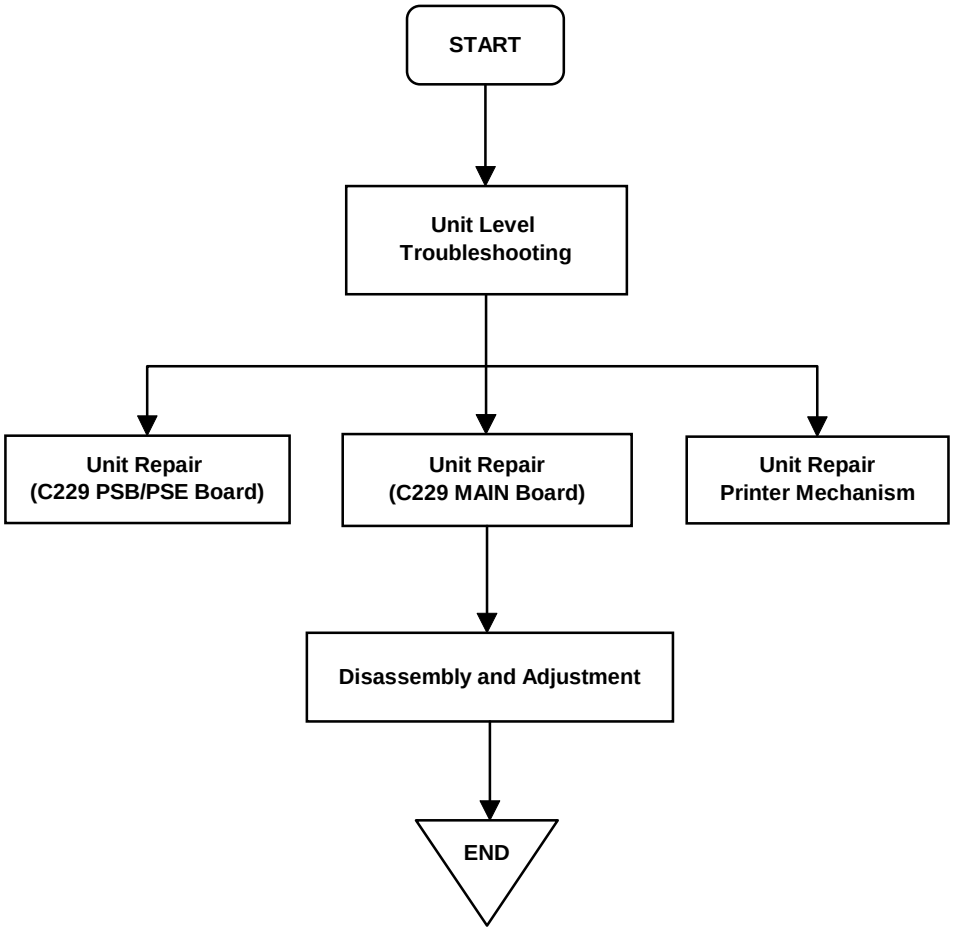


Figure 5-1. Troubleshooting Process Flowchart

The table below lists tools required for troubleshooting.

Table 5-1. Required Tools

Tool	Description
Oscilloscope	Greater than 50 MHz recommended.
Multimeter	Digital recommended. (Analog can be used.)

The following table lists error conditions and shows how they are identified by the beeper and indicator lights.

Table 5-2. Error Conditions

Error Condition	Indicator				
	Pause	**Paper Out**	**Tear Off/ Bin**	**Font**	**Beeper**
Paper out error	On	On	—	—	❍ × 3
Release lever error	On	Blinks	—	—	● × 5
Paper eject error	On	Blinks	—	—	❍ × 3
Head hot	Blinks	Blinks	—	—	—
Fatal error	Blinks	Blinks	Blinks	Blinks	—

Notes:

1. *❍ indicates that the beep sounds for 100 ms with an interval of 100 ms.*
2. *● indicates that the beep sounds for 500 ms with an interval of 100 ms.*
3. *A fatal error condition is caused by either a carriage jam or an improper voltage sensed by the power supply.*

Motors

You can use a multimeter to make sure the PF and CR motor coils are good. To check the motors, disconnect their cables from CN8 and CN9 on the main board, and clip the meter's leads directly to the exposed wires on the ends of the cables. The table below shows the expected resistance values for each motor. When replacing a cable, be sure to insert its red wire at pin 1.

Table 5-3. Motor Test Points

Motor Connector Number	**Common Pin Number**	**Test Pin Number**	**Test Method** **(Set meter to ohms. Disconnect motor from main board after printer is powered off.)**	**Meter Reading**
PF Motor CN8	1	3	Place one lead on pin 1 and the other lead on pin 3.	16.0 Ω ± 10% at 77° F (25° C)
	2	4	Place one lead on pin 2 and the other lead on pin 4.	
CR Motor CN9	5	1, 2, 3, 4	Place one lead on pin 5 and the other lead on each of 4 test pins.	2.7 Ω ± 10% at 77° F (25° C)

Motor Drivers

If a motor is not working but its coils seem okay, check the driver. Also, check the driver whenever you find a defective motor. (When a motor is defective, it sometimes damages the driver.)

PF Motor Driver

To check the PF motor driver (IC11), disconnect the motor cable from CN8 on the main board. Measure the resistance across the pins as shown below. Any pin from 7 through 17 can be used as the second pin (these are all tied together to the ground). The meter readings should hold constant, and all readings should be within 10% of each other.

Table 5-4. PF Motor Driver Resistance Values

Motor Coil	Pins to Measure Across		Expected Resistance Level
A	3	7-17	Constant and all within ±10%
	6	7-17	
B	18	7-17	
	21	7-17	

CR Motor Driver

To check the CR motor driver (IC8), make sure the cable connector from the motor is plugged in at CN9 on the main board. Measure the resistance across the pins as shown below. The meter readings should hold constant, with the high readings within 10% of each other and the low readings within 10% of each other.

Table 5-5. CR Motor Driver Resistance Values

Pins to Measure Across		Expected Resistance Levels	
8	4	High	Both readings should be constant and within ±10% of each other.
18	15	High	
1	4	Low	Both readings should be constant and within ±10% of each other.
11	15	Low	

Printhead

You can check for an open circuit in the printhead's solenoid coils by using a multimeter and the table below. Note that the test pin numbers shown in Figure 5-2 match the individual printhead solenoids (dot wires).

Remove the printhead by following the instructions in Chapter 3. Be sure to perform the platen gap adjustment after replacing or re-installing the printhead.

Table 5-6. Printhead Solenoid Resistance Test Points

Common Pin Number	Test Pin Number	Test Method	Specifications
C1	1, 4	Place one lead on pin C1 and the other pin on pin 1 to test solenoid 1. Place one lead on pin C1 and the other lead on pin 4 to test solenoid 4.	8.19 ± 0.8 Ω at 77° F (25° C)
C2	8	Place one lead on pin C2 and the other pin on pin 8 to test solenoid 8.	8.19 ± 0.8 Ω at 77° F (25° C)
C3	2, 6	Place one lead on pin C3 and the other pin on pin 2 to test solenoid 2. Place one lead on pin C3 and the other lead on pin 6 to test solenoid 6.	8.19 ± 0.8 Ω at 77° F (25° C)
C4	5, 9	Place one lead on pin C4 and the other pin on pin 5 to test solenoid 5. Place one lead on pin C4 and the other lead on pin 9 to test solenoid 9.	8.19 ± 0.8 Ω at 77° F (25° C)
C5	3, 7	Place one lead on pin C5 and the other pin on pin 3 to test solenoid 3. Place one lead on pin C5 and the other lead on pin 7 to test solenoid 7.	8.19 ± 0.8 Ω at 77° F (25° C)

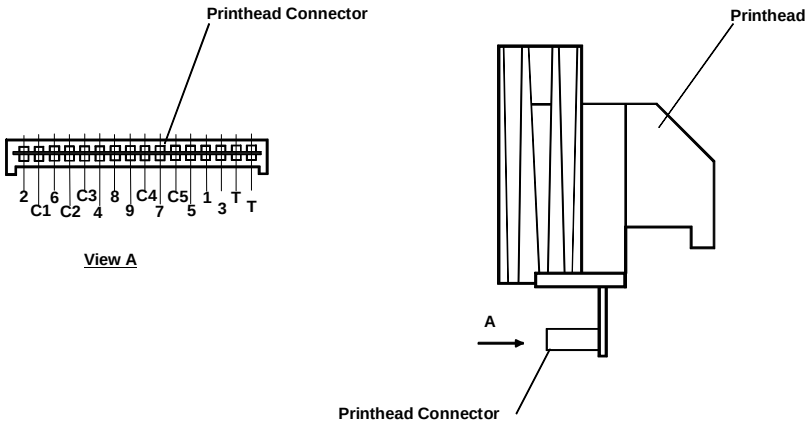


Figure 5-2. Printhead Connector Pin Alignment

Printhead Driver

If the printhead is not working but its solenoids test okay, check the driver circuitry. Also, check the driver whenever you find a defective solenoid in the printhead. (When a solenoid goes out, it sometimes damages the driver.) When testing, you should make sure that all transistors within any group in the table below have readings consistent with each other, within ±10%. The printhead may be left connected during this procedure, but the printer itself must be unplugged from the power supply.

Table 5-7. Printhead Driver Test Points

Transistor	Leads to Measure Across	Meter Reading (resistance)
Power Transistors (for individual dot wire solenoids) Q2,Q3,Q4,Q5,Q6,Q7,Q8, Q9,Q10	B → E	Neither open nor shorted.
	E → B	Neither open nor shorted.
	B → C	Neither open nor shorted.
	C → B	O.L.
Power Transistors (for common leads on printhead) Q21,Q22,Q23,Q24,Q25	B → E	Neither open nor shorted.
	E → B	Neither open nor shorted.
	B → C	Neither open nor shorted.
	C → B	Neither open nor shorted.
Small-signal Transistors (surface-mount type) Q11,Q12,Q13,Q14,Q15	B → E	Neither open nor shorted.
	E → B	Neither open nor shorted.
	B → C	Neither open nor shorted.
	C → B	Neither open nor shorted.
Small-signal Transistors (surface-mount type) Q16,Q17,Q18,Q19,Q20	B → E	O.L.
	E → B	Neither open nor shorted.
	B → C	O.L.
	C → B	Neither open nor shorted.

Note: *The middle lead on the surface-mounted transistors corresponds to the base.*

Sensors

You can test a sensor by disconnecting its cable connector from the main board and applying the meter's leads directly to the exposed (uninsulated) side of the connector.

Table 5-8. Sensor Test Points

Sensor Connector Number	Test Pin Number	Test Method (Set meter to ohms. Check that printer power is off.)	Meter Reading
CN4 (HP Sensor)	1: HP 2: GND	Place one lead on pin 1 and the other lead on pin 2, and check the continuity while toggling the sensor lever.	Short: Home position Open: Not home
CN6 (Front PE Sensor)	1: PE 2: GND	Place one lead on pin 1 and the other on pin 2, and check the continuity while toggling the sensor lever.	Open: Paper loaded Short: No paper
CN10 (Release Lever Sensor)	1: RELEASE 2. GND	Place one lead on pin 1 and the other on pin 2, and check the continuity while toggling the sensor lever.	Open: Friction feed mode Short: Tractor mode (either push, pull, or push and pull)
CN11 (PG Sensor)	1: PG 1 2: GND	Place one lead on pin 1 and the other on pin 2, and check the continuity while moving the sensor lever from –0 to 6.	Meter should toggle between: Open and Short. (Open: PG –1 to 3)
Printhead thermistor	T pins	Place one lead on one pin T, and the other on the second pin T to check resistance. See Figure 5-2.	Approximately 14K Ω (at 62.6° F, or 17° C)

Power Supply

The output voltages of the power supply can be measured by pulling out the flat cable (CN2) from connector CN3 on the main board.

Table 5-9. Output Voltage of the Power Supply Board

Connector	Pin	Output voltage
CN2 (flat cable on the power supply board)	1, 2	GP
	3, 4	+ 35 V
	5, 6	GL
	7, 8	+ 5 V

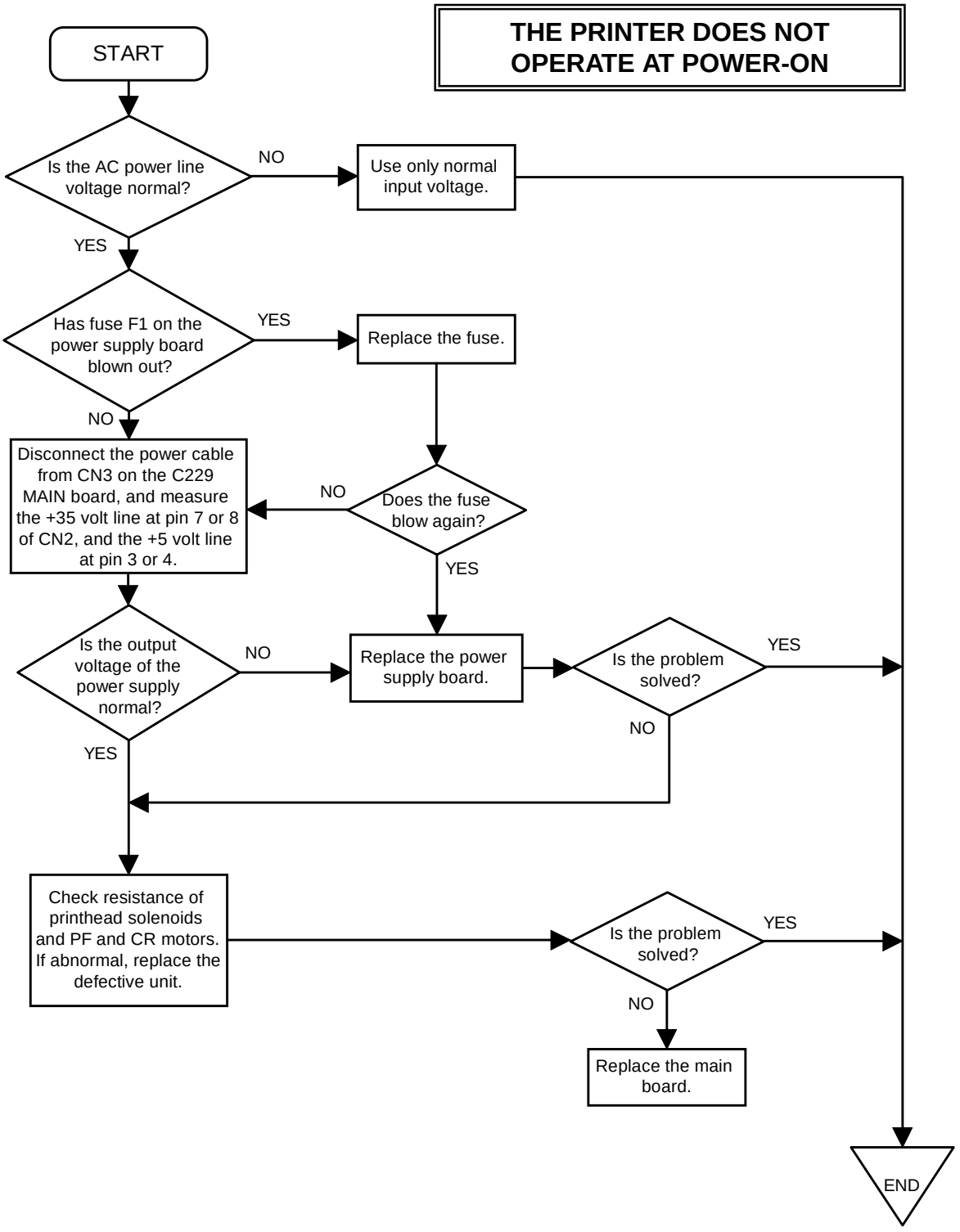
Note: *The ground terminals GP and GL are connected and are not separate grounds.*

Unit Level Troubleshooting

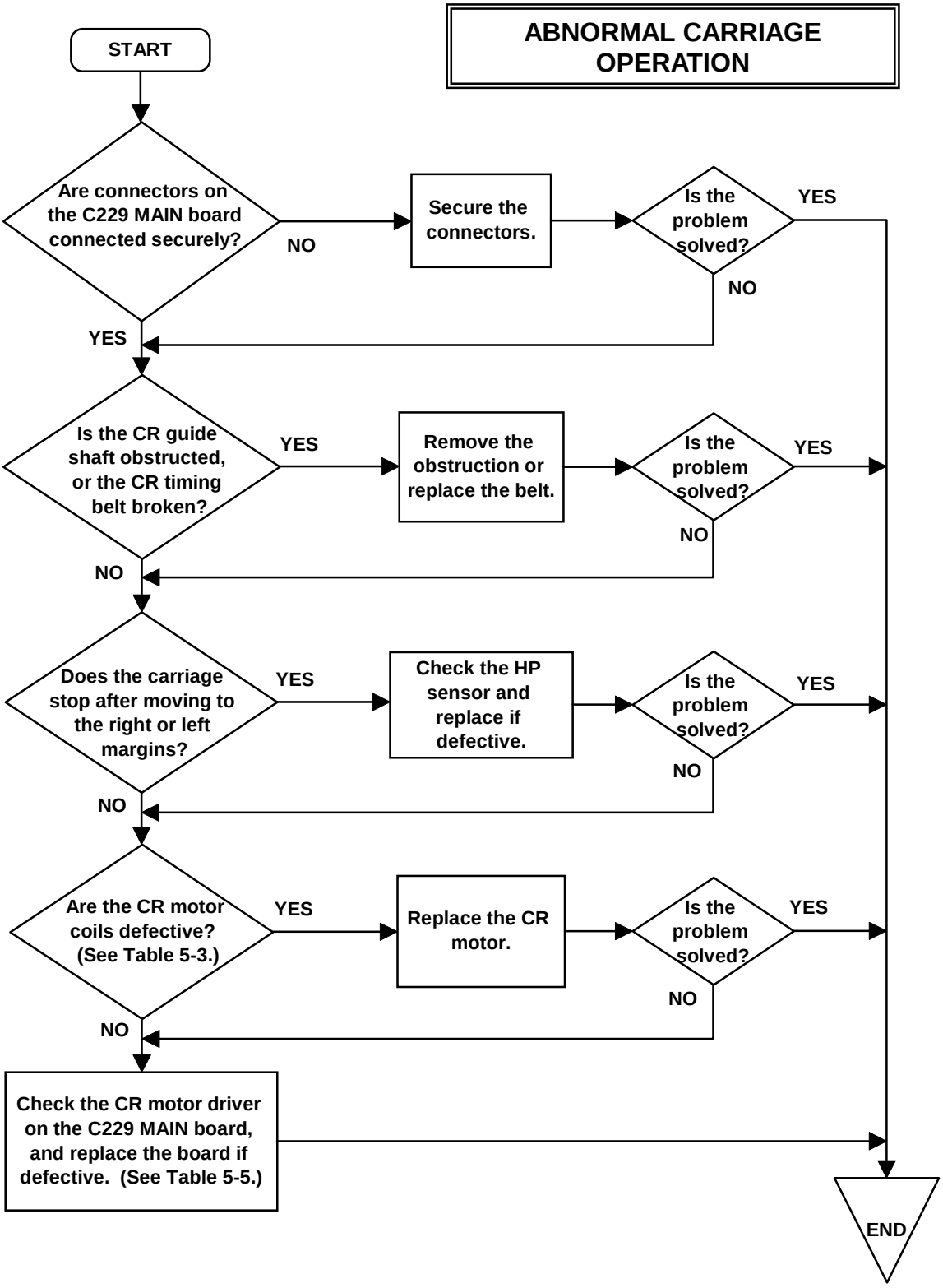
When a problem occurs, you can identify the defective unit based on the symptoms. The table below lists symptoms for certain problems. Once a problem is identified, refer to the flowchart that corresponds to the problem.

Table 5-10. Symptoms and Problems

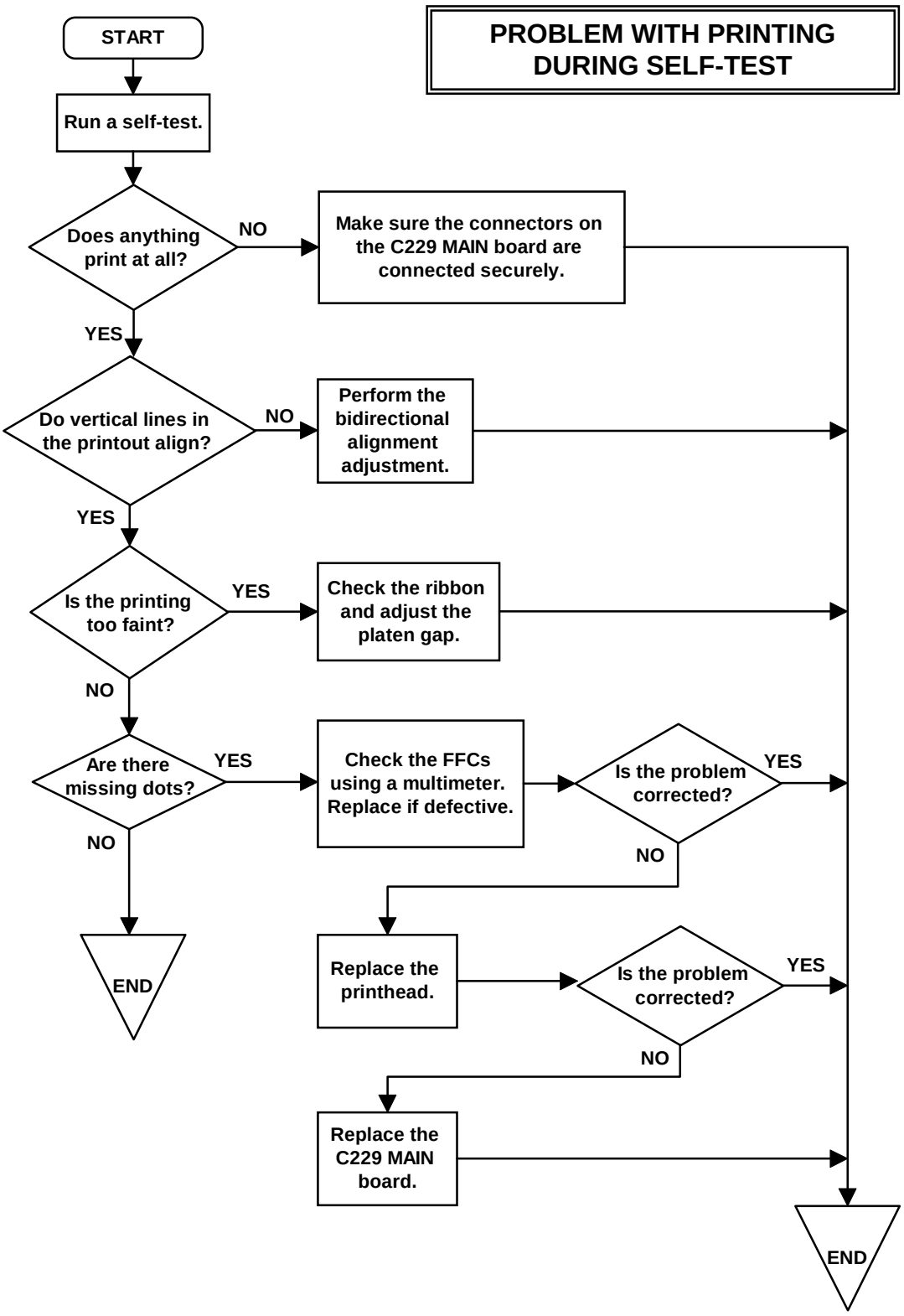
Symptom	Problem Description	Flowchart No.
The printer does not operate at power on.	❑ LEDs do not light. ❑ Carriage does not move.	Flowchart 1
Abnormal carriage operation.	❑ When the printer is powered on, the carriage moves away from home position after a moment and stops. ❑ When the printer is powered on, the carriage returns to home position, but the printer fails to enter the READY mode.	Flowchart 2
Problem with printing during self-test.	❑ Self-test is not printed. ❑ Abnormal printing. ❑ Print quality is poor.	Flowchart 3
Printer does not feed paper correctly.	❑ No paper is fed. ❑ Paper feed is irregular. ❑ Paper jam occurs.	Flowchart 4
Control panel operation is abnormal.	❑ No response to pressed buttons. ❑ Abnormal indication on the control panel.	Flowchart 5
Printer fails to print from PC.	❑ Self-test prints correctly, but data from the PC does not print correctly. ❑ Printer does not print. ❑ Printer error message appears on screen.	Flowchart 6


THE PRINTER DOES NOT OPERATE AT POWER-ON
START
Is the AC power line voltage normal?
NO
Use only normal input voltage.
YES
Has fuse F1 on the power supply board blown out?
YES
Replace the fuse.
NO
Disconnect the power cable from CN3 on the C229 MAIN board, and measure the +35 volt line at pin 7 or 8 of CN2, and the +5 volt line at pin 3 or 4.
NO
Does the fuse blow again?
YES
Is the output voltage of the power supply normal?
NO
Replace the power supply board.
Is the problem solved?
YES
NO
YES
Check resistance of printhead solenoids and PF and CR motors. If abnormal, replace the defective unit.
Is the problem solved?
YES
NO
Replace the main board.
END

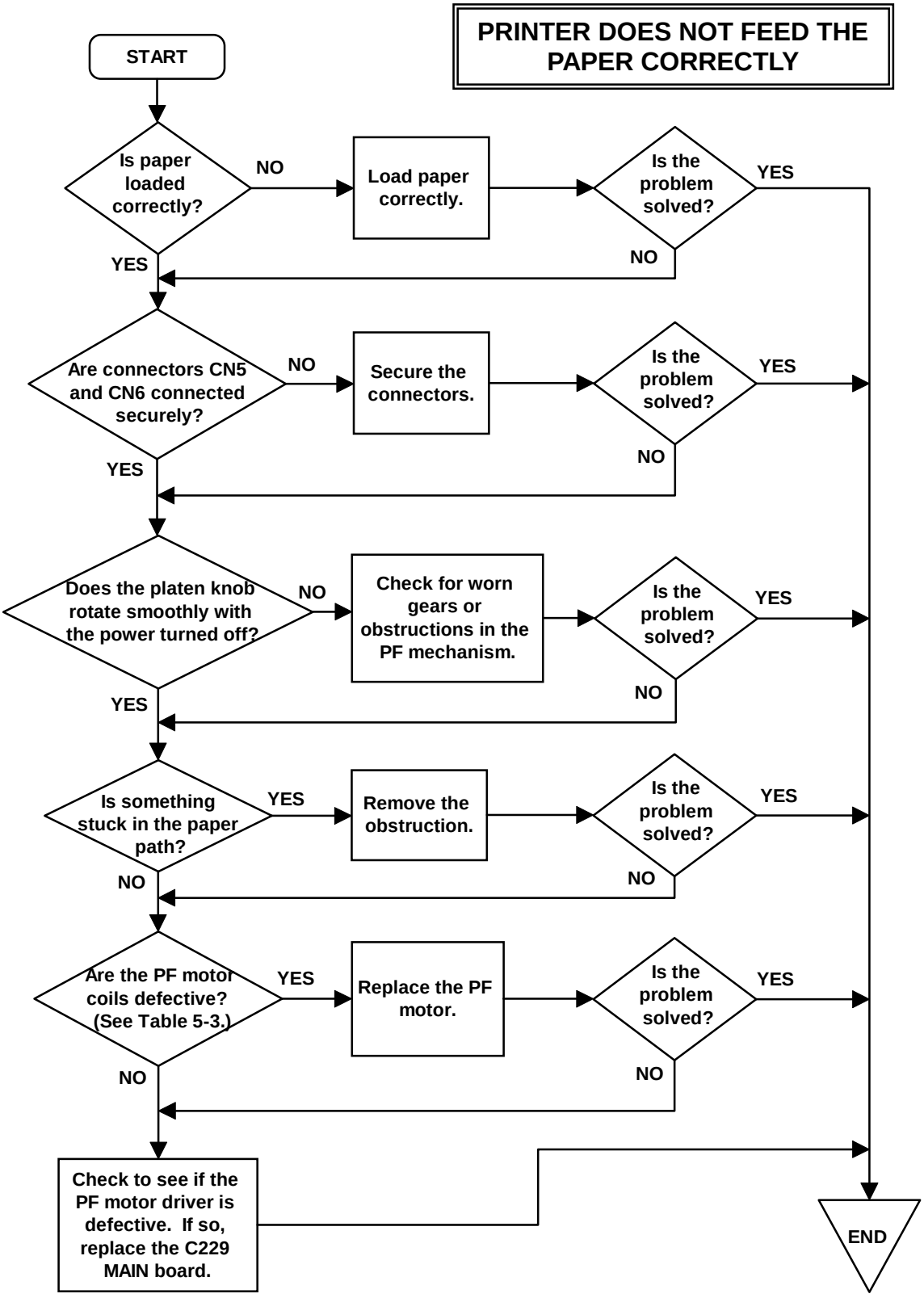
Flowchart 1. The Printer Does Not Operate at Power-On



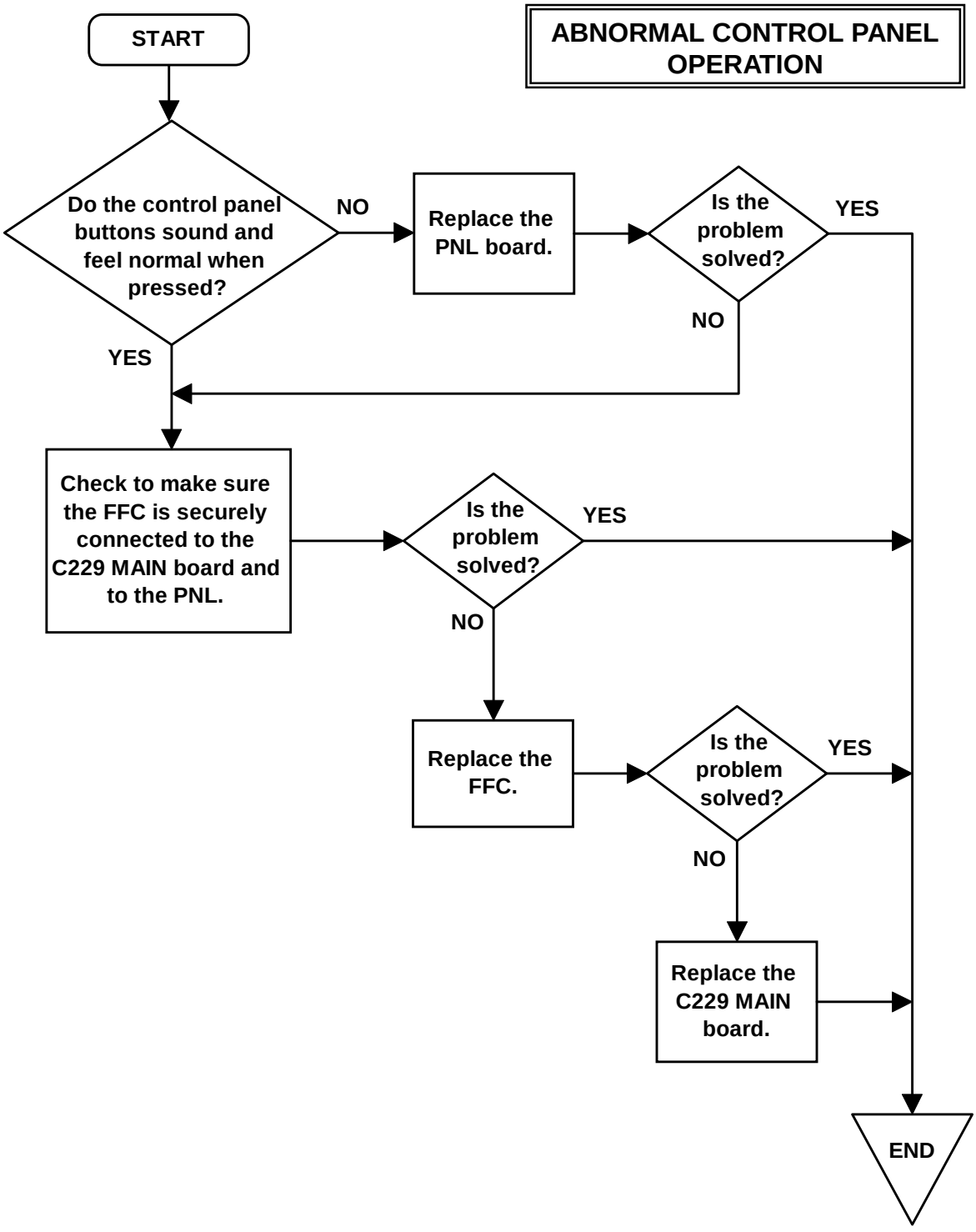
Flowchart 2. Abnormal Carriage Operation



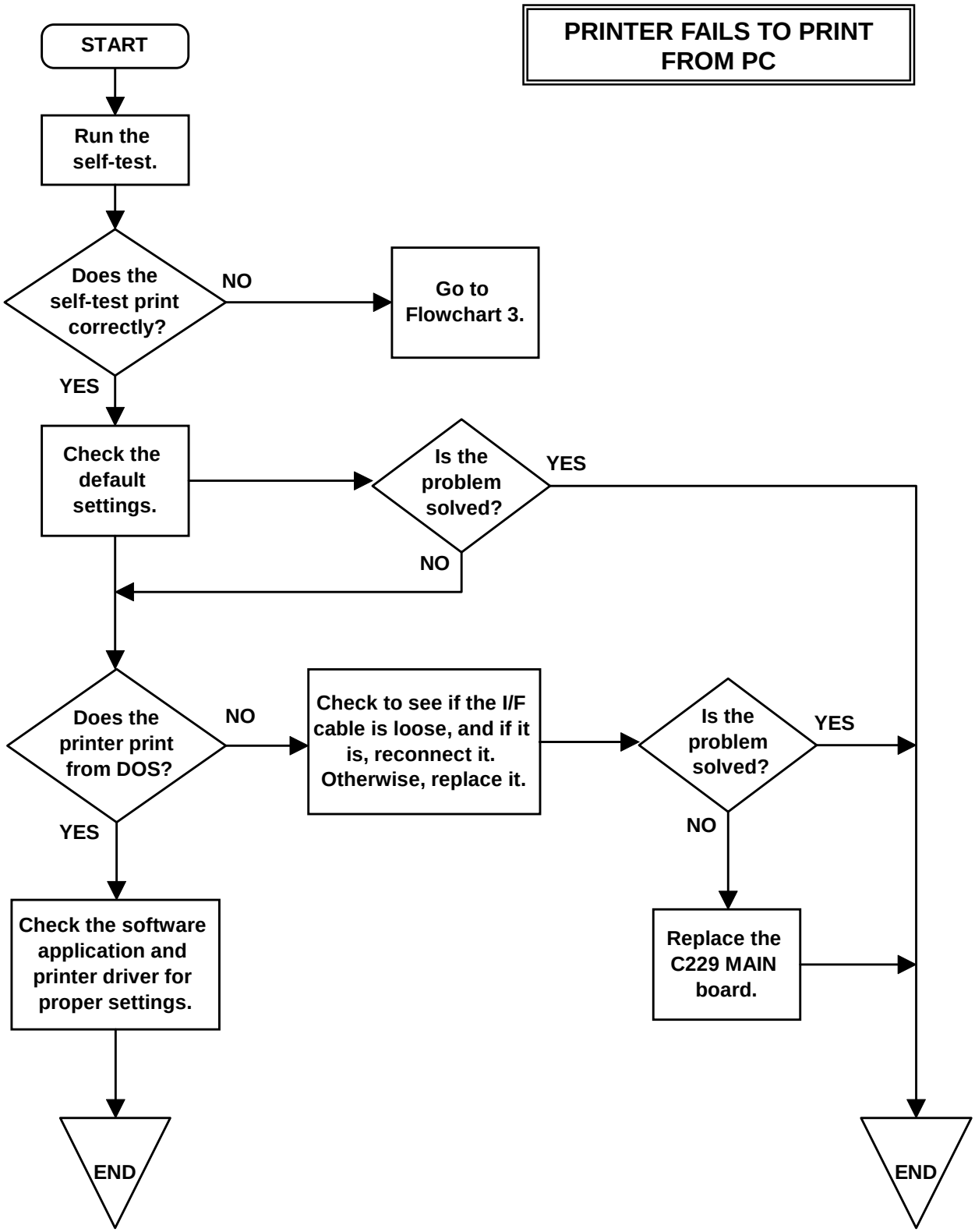
Flowchart 3. Problem With Printing During Self-test



Flowchart 4. Printer Does Not Feed the Paper Correctly



Flowchart 5. Abnormal Control Panel Operation



Flowchart 6. Printer Fails to Print from PC

Repairing the Power Supply Circuit Board

This section describes how to identify and repair problems with the C229 PSB/PSE/PSH power supply board. The table below lists symptoms, likely causes, and solutions to various problems. The checkpoints refer to waveforms, resistances, and other values that should be present when the component is working properly. Sometimes, the same solution may be offered for an entire class of problems; in this case, the checkpoints should be used for reference or as aids to further investigation.

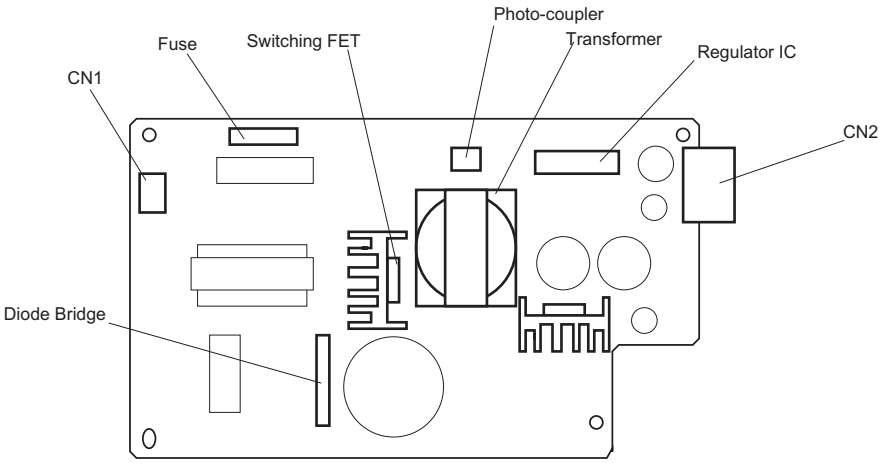


Figure 5-3. Power Supply Board Layout

Table 5-11. Repairing the C229 PSB/PSE Board

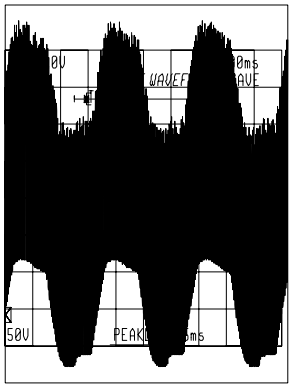
Symptom	Condition	Possible Cause	Checkpoint	Solution
The printer does not operate.	The +35 V line does not test at the correct voltage.	Fuse F1 is blown.	Examine the fuse to see if it's blown.	Replace the power supply board.
		The transformer coil (T1) is open.	Measure the resistance of the T1 transformer coil.	Replace the power supply board.
	.	Switching FET (Q1) is defective.	Check the voltage waveform between the source and drain of Q1. 	Replace the power supply board.

Table 5-11. Repairing the C229 PSB/PSE Board (continued)

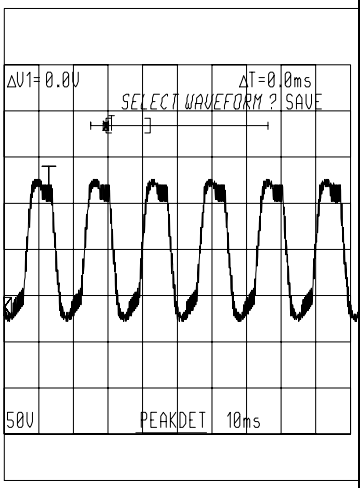
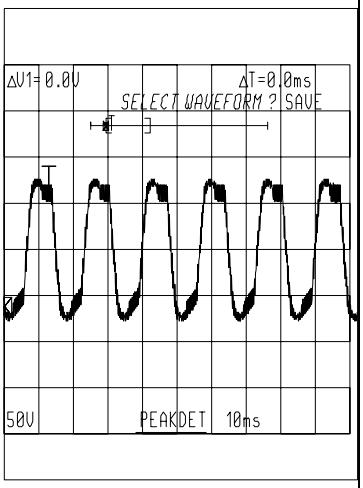
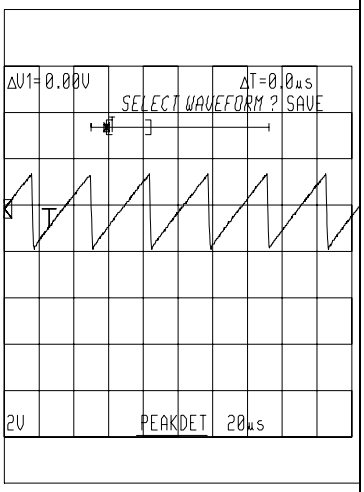
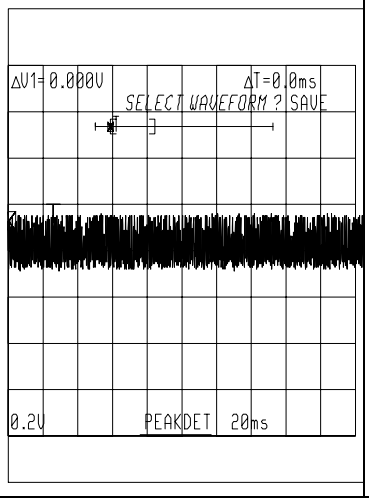
Symptom	Condition	Possible Cause	Checkpoint	Solution
The printer does not operate. (continued)	The +35 V line is defective. (continued)	Q2 or Q3 is defective. (continued)	Check the voltage waveform between the collector and emitter of Q2 and Q3. 	Replace the power supply board.
		PC1 is defective	Check the voltage waveform at pins 5 and 7 of PC1. The frame may be used as the ground. 	Replace the power supply board.

Table 5-11. Repairing the C229 PSB/PSE Board (continued)

Symptom	Condition	Possible Cause	Checkpoint	Solution
The printer does not operate. (continued)	The +5 V line is defective.	IC51 is defective.	Check the voltage waveform at pin 5 of IC51. You can use pin 9 as the ground. 	Replace the power supply board.
			Check the voltage waveform at pins 9 and 10 of IC51. Use the frame as the ground. 	Replace the power supply board.

Repairing the Main Board Assembly

This section describes how to identify and repair problems with the C229 MAIN board. The table below lists symptoms, likely causes, and solutions to various problems. The checkpoints refer to waveforms, resistances, and other values that should be present when the component is working properly. Sometimes, the same solution may be offered for an entire class of problems; in this case, the checkpoints should be used for reference or as aids to further investigation.

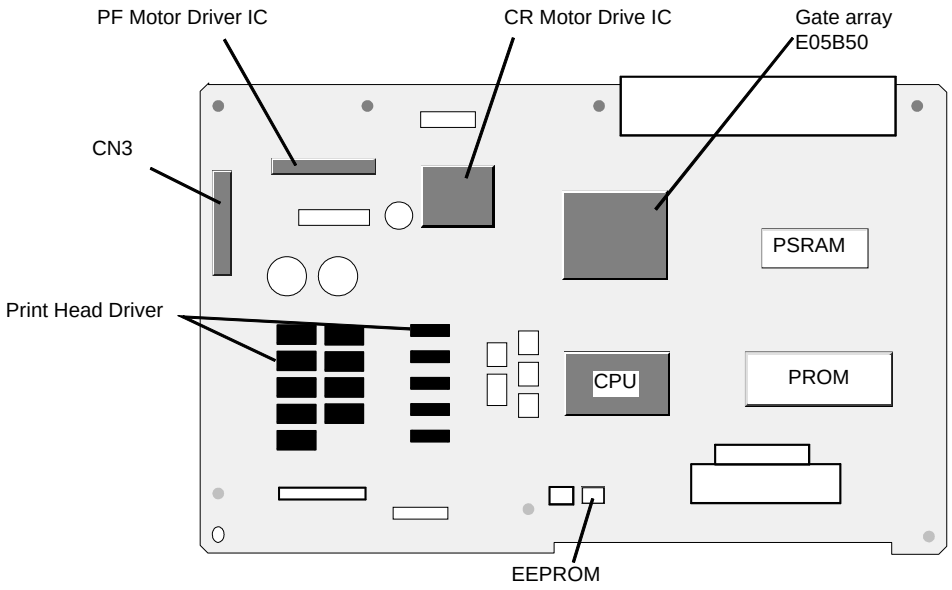


Figure 5-4. Main Board Layout

Table 5-12. Repairing the C229 Main Board Assembly

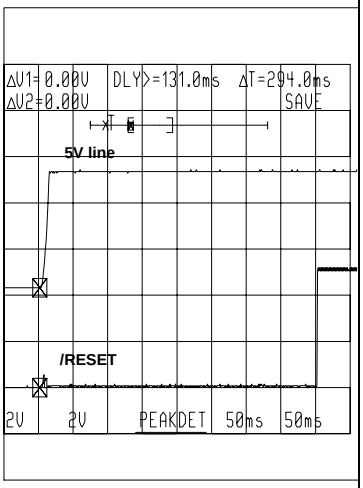
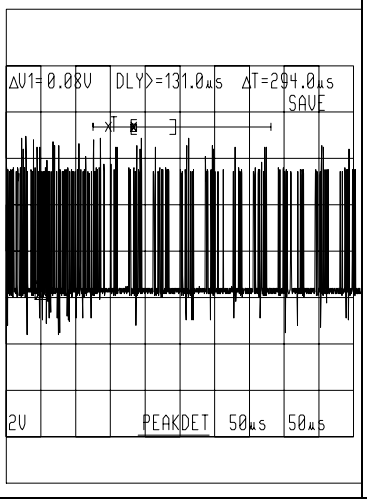
Symptom	Condition	Possible Cause	Checkpoint	Solution
The printer does not operate.	The CPU does not operate.	Defective operation of the reset circuit.	While turning on the power, check the voltage waveforms for the +5 VDC line (pin 3 of IC1) and the reset signal (pin 1 of IC1). You can use pin 4 as the ground. 	Replace the main board.
		The ROM selection jumper is defective.	Check the signal waveform at pin 22 of IC7 and pin 30 of IC6. (The signal should be present at one pin, but not the other.) You may use pin 15 as the ground. 	Replace the power supply board.

Table 5-12. Repairing the C229 Main Board Assembly (continued)

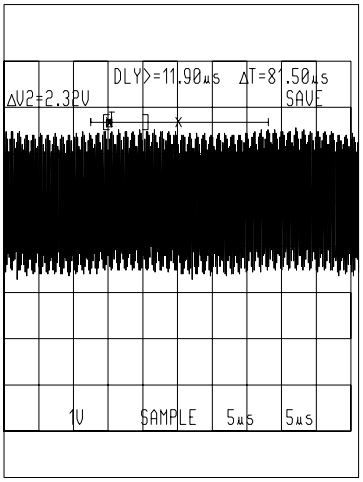
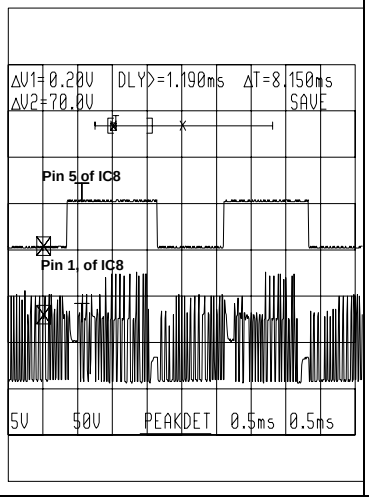
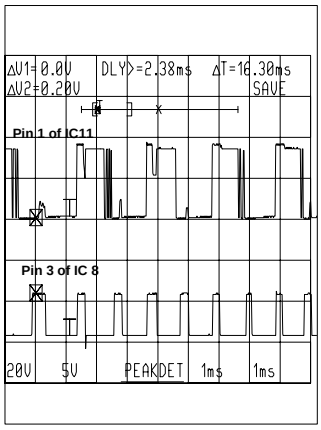
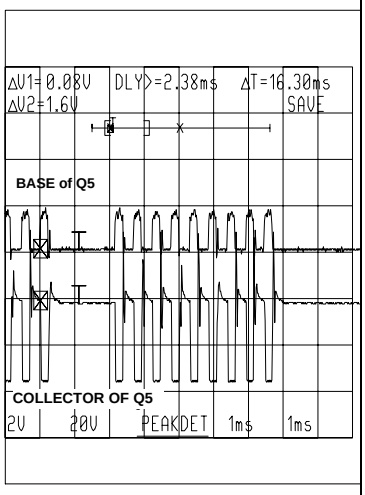
Symptom	Condition	Possible Cause	Checkpoint	Solution
The printer does not operate. (continued)	The CPU does not operate. (continued)	The CPU is defective.	Check the signal at pin 26 or 27 of IC3 (This is the CPU's clock signal.) Pin 28 may be used as the ground. 	Replace the main board.
Carriage operation is abnormal.	The carriage does not operate.	IC8 is defective.	Check the carriage motor phase control signals at pins 5, 6, 16, and 17 of IC8; also, check the motor drive signals at pins 1, 8, 11, and 18 of IC8. The chassis frame may be used as the ground. 	Replace the main board.

Table 5-12. Repairing the C229 Main Board Assembly (continued)

Symptom	Condition	Possible Cause	Checkpoint	Solution
Paper feeds abnormally	Paper does not feed	IC11 is defective.	Check the paper feed motor phase control signals at pins 1, 2, 23, and 24 of IC11; also check the motor drive signals at pins 3, 6, 18, and 21 of IC11. Any pin 7-17 may be used as the ground, or use the chassis frame. 	Replace the main board.
Self-test printing is abnormal.	The self-test does not execute, or the printer does not print a particular dot.	❑ One of the transistors between Q2 and Q10 is defective. ❑ One of the transistors between Q11 and Q25 is defective.	Check the printhead drive signal at the collector and base of Q2 through Q10. In each case, the emitter may be used as the ground. 	Replace the main board.
Data from the host prints incorrectly.	Data corruption occurs when the interface is used.	The CPU or IC2 is defective.		

Repairing the Printer Mechanism

This section provides instructions for repairing the printer mechanism. It describes various problems, symptoms, likely causes, checkpoints, and solutions. The checkpoint column shows items to be checked, including proper values to be set for each component of the printer mechanism. For disassembly instructions, see Chapter 3. For adjustment instructions, see Chapter 4.

Table 5-13. Repairing the Printer Mechanism

Symptom	Condition	Possible Cause	Checkpoint	Solution
CR operation is abnormal.	Carriage does not move even after power is turned on.	A foreign object is blocking the mechanism.	Manually move the timing belt to check that the motor rotates normally.	Remove any foreign objects.
		The platen gap may be badly adjusted.	Check for the proper adjustment. (See Chapter 4.)	Adjust the platen gap.
		CR motor is defective	❑ Measure the coil resistance of the motor. (It should be 16 Ω ± 10%. See Table 5-3.) ❑ If there's a short circuit in the motor, see if there's also a short-circuit in the driver circuit (IC8) on the main board.	Replace the CR motor or main board.
	The CR motor rotates, but the carriage does not move.	The pulley drive is defective.	Check to see if the pulley is broken or worn out.	Replace the pulley drive.
		The timing belt is defective.	❑ Check whether the timing belt is installed correctly on the carriage. ❑ Make sure the timing belt is not broken or worn out.	Replace or reinstall the timing belt.
	The carriage moves a little to the left, then stops.	The carriage does not move smoothly.	Check that the carriage moves smoothly when moved by hand.	Clean and lubricate the CR guide shaft and frame, or replace the CR motor.
	The carriage stops after moving to the right or left margins.	The HP sensor is defective.	Use the multimeter to check the HP sensor. (See Table 5-8.)	Replace the HP sensor.

Table 5-13. Repairing the Printer Mechanism (continued)

Symptom	Condition	Possible Cause	Checkpoint	Solution
Printing is abnormal.	The carriage moves, but no printing occurs.	Printhead FFC is disconnected or damaged.	Check that the head FFC is connected securely to the board and carriage.	Connect or replace the printhead FFC.
		The printhead is defective	Measure the coil resistance of the printhead. See Table 5-4. It should be about 8 Ω.	Replace the printhead; if necessary, replace the printer driver.
	A dot does not print.	The printhead is defective.	❑ Check to see if the printhead wire is broken. ❑ Measure the printhead coil resistance. See Table 5-6. It should be about 8 Ω. ❑ If there's a short circuit in the coil, check to see if there's a short circuit in the driver too.	Replace the printhead. Replace the printhead driver, if necessary.
	The printout is uneven or too light.	The printhead is defective.	Check to see if the printhead wire is broken.	Replace the printhead.
		The platen gap is not adjusted properly.	Set the gap adjustment lever to the first position. The platen gap should be 0.365 ± 0.015.	Adjust the platen gap. See Chapter 4.
Abnormal paper feed.	Printing is performed; however, paper does not feed, or does not feed smoothly.	There are foreign objects in the paper path.	Visually inspect the paper path.	Remove any foreign objects.
		PF motor does not operate normally.	❑ Check to see if there are foreign objects blocking the motor or drive gear. ❑ Check to see if the gears are damaged or worn out.	Remove any foreign objects, or replace the gears.
		The PF motor is defective.	❑ Measure the coil resistance of the PF motor. See Table 5-3. It should be about 16 Ω ± 10%. ❑ If there's a short circuit in the coil, check to see if there's a short circuit in the driver too.	Replace the PF motor; if necessary, replace the driver.

Table 5-13. Repairing the Printer Mechanism (continued)

Symptom	Condition	Possible Cause	Checkpoint	Solution
Ribbon feed is abnormal.	The ribbon is not fed.	The ribbon cartridge is defective.	Remove the ribbon cartridge. Rotate the ribbon feed roller manually to check that the ribbon cartridge feeds the ribbon normally.	Replace the ribbon cartridge.
		There are foreign objects caught in the gears of the ribbon feed mechanism.	❑ Move the carriage manually from left to right to make sure the RD ratchet rotates. ❑ Check to see if foreign objects are caught in the ribbon feed mechanism.	Remove any foreign objects. If there are no foreign objects, replace the ribbon feed mechanism.
	The ribbon feeds correctly when the carriage moves in one direction, but fails to feed when the carriage moves in the opposite direction.	The planet gear or planet gear lever is defective.	Look at the ribbon drive gears as you move the carriage manually to make sure they're working properly.	Replace the ribbon feed mechanism.
The printout appears dirty.	There are ink spots or dirt on the printout.	❑ The ribbon mask is positioned incorrectly. ❑ The platen gap is not adjusted correctly.	❑ Make sure the ribbon mask is positioned correctly. ❑ Set the gap adjustment lever to the first position, then check the platen gap. It should be 0.365 ± 0.015.	❑ Reinstall the ribbon mask. ❑ Adjust the platen gap. See Chapter 4.
Printing without paper	Printing continues past the end of the page.	The PE sensor is defective.	Check the PE sensor. See Table 5-8.	Replace the PE sensor.

6. Maintenance

Preventive Maintenance..... 6-1
Lubrication..... 6-1

Preventive Maintenance

To keep the printer in optimum condition and prevent printer problems, vacuum the printer mechanism to remove dust and paper debris and regularly clean the exterior case with denatured alcohol. After cleaning the unit, check that it is properly lubricated as described under *Lubrication*, below. Also inspect the springs and rollers to see that they are operating properly.

⚠ CAUTION

- *Disconnect the printer from the external AC power source before performing any maintenance procedures.*

⚠ CAUTION

- *Do not use thinner, trichloroethylene, or ketone-based solvents on the plastic components of the printer.*

Lubrication

Table 6-1 describes the recommended lubricants. These lubricants have been tested extensively and have been found to comply with the needs of this printer. Using other lubricants may cause the printer to malfunction, especially at low temperatures.

⚠ CAUTION

- *Never use lubricants other than those specified below. Using other lubricants may damage the printer and components.*

Table 6-1. Lubricants

Type	Name	Quantity	Availability	Part No.
Grease	G-26	40 mg	EPSON	B702600001
Oil	O-2	40 cc	EPSON	B710200001

Apply lubricant to the printer at the points shown in Figures 6-1 through 6-5. Table 6-2 lists each lubrication point along with its recommended lubricant. Before applying lubricant, make sure the surface to be lubricated is clean. Do not apply too much lubricant, because this may damage nearby components.

Note:

Apply lubricant before reassembling the printer.

Table 6-2. Lubrication Points

Ref. No.	Lubrication Points	Lubricant
1	Cam surface on the 34.5 mm spur gear	G-26 (5 mg)
2	The shaft end of the PF drive roller assembly	G-26 (5 mg)
3	The platen gap adjustment slots on the left frame (excluding the two slots at the bottom)	G-26 (3 mg for each slot)
4	Oil pad	O-2 (0.6 ml)
5	The contact points for the gear and shaft in the ribbon drive assembly	G-26 (3 mg)
6	The inside hole and three shafts in the ribbon drive assembly	G-26 (3 mg)
7	Various contact points for the ribbon drive gear assembly	G-26 (3 mg)
8	6 contact points for the paper guide and release shaft.	G-26

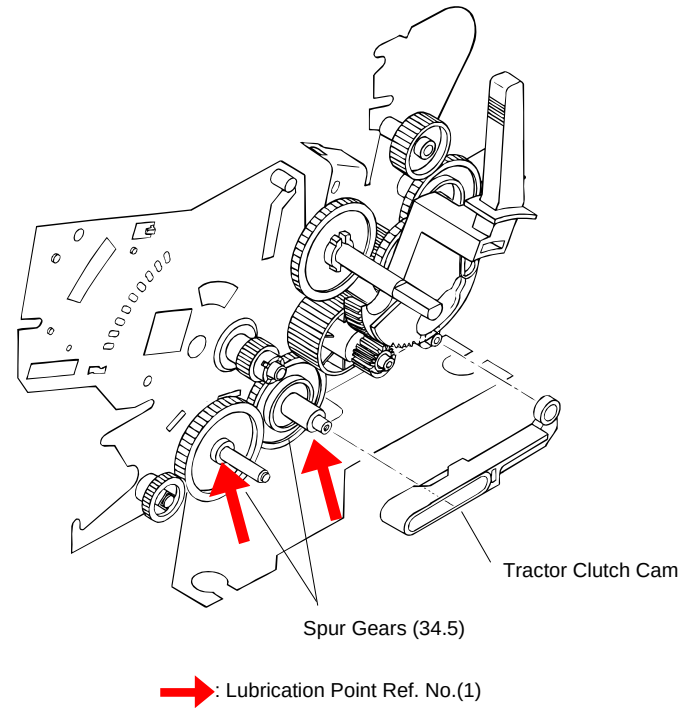


Figure 6-1. Lubrication Point 1

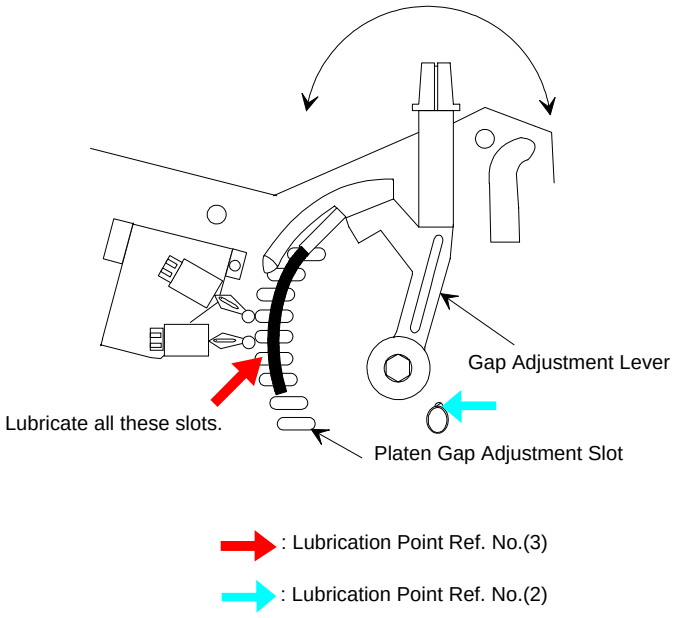

Gap Adjustment Lever
Lubricate all these slots.
Platen Gap Adjustment Slot
: Lubrication Point Ref. No.(3)
: Lubrication Point Ref. No.(2)

Figure 6-2. Lubrication Points 2 and 3

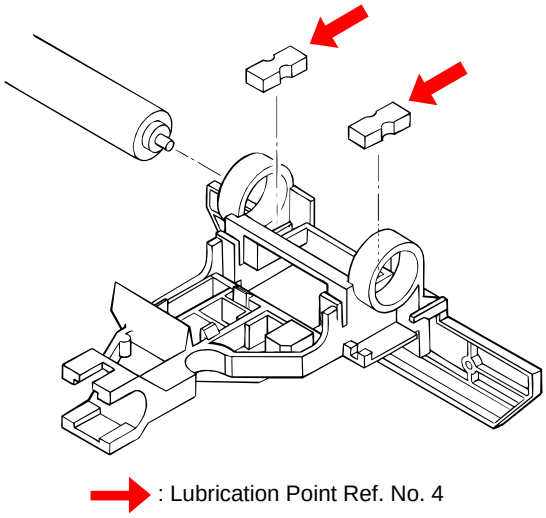


Figure 6-3. Lubrication Point 4

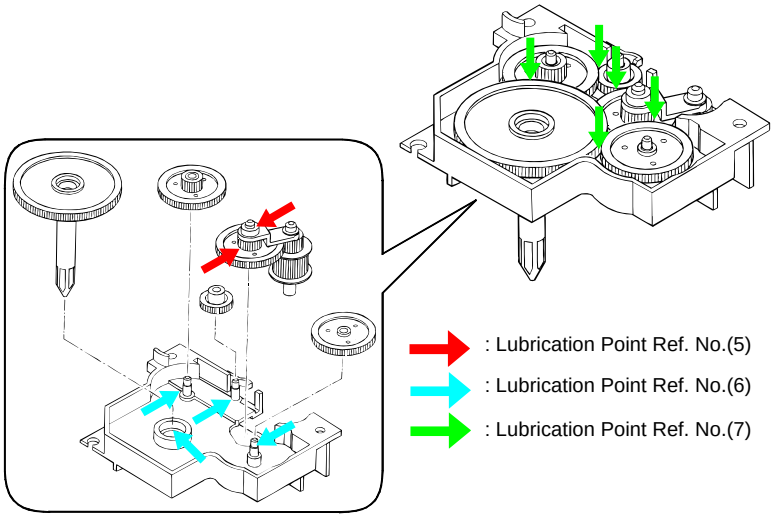


Figure 6-4. Lubrication Points 5, 6, and 7

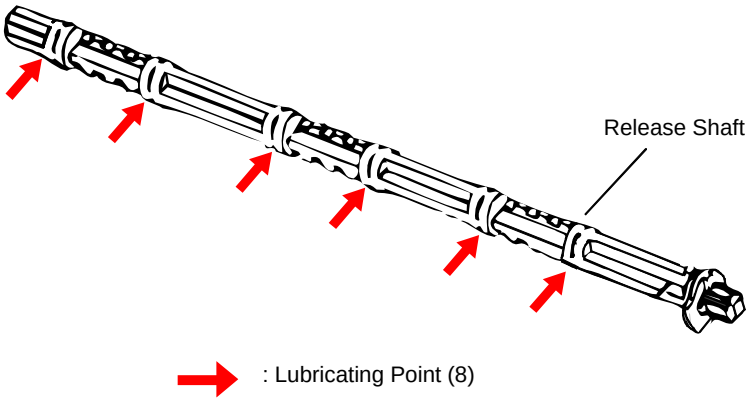


Figure 6-5. Lubrication Point 8

Appendix

Connector Summary A-1
Component Layout A-7
Exploded Diagrams A-11
Dimensions and Weight A-15
Circuit Diagrams A-17

Connector Summary

Figure A-1 illustrates how primary components are connected. Table A-1 lists connector descriptions and locations.

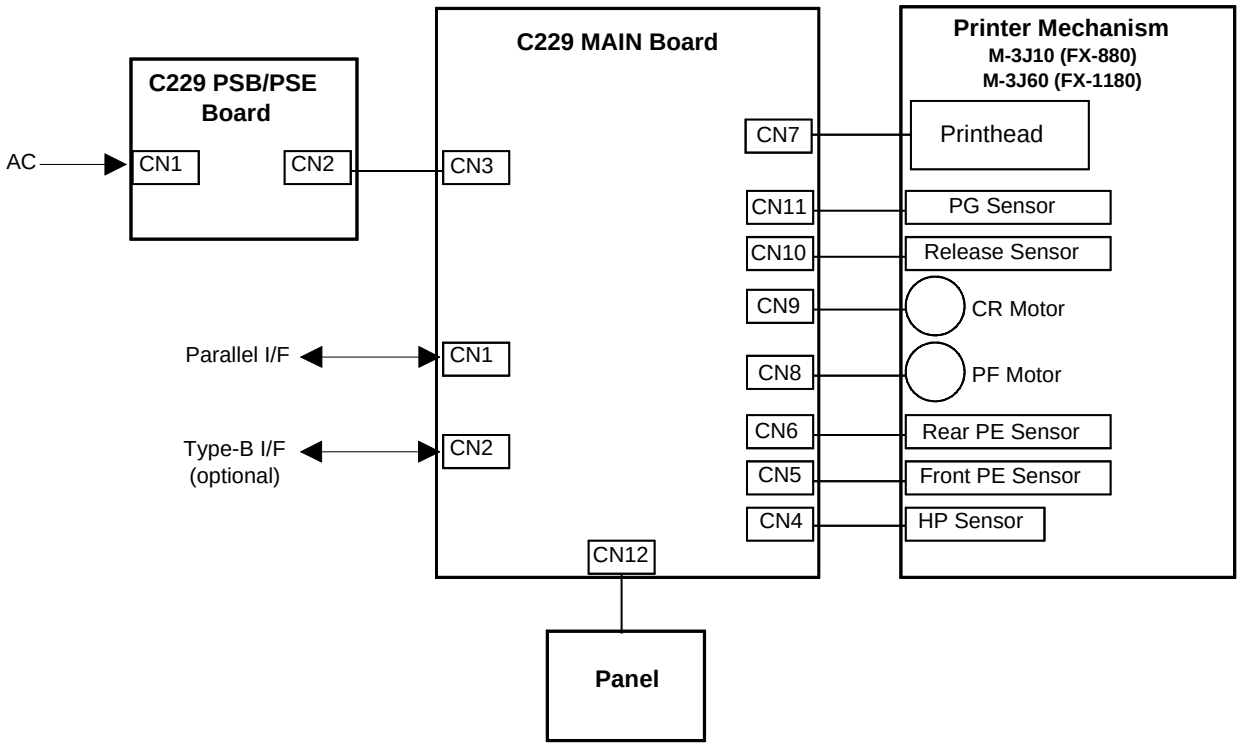


Figure A-1. Cable Connections

Table A-1. Connector Summary

Board	Connector	Pin	Description
C229 Main Board Assembly	CN1	36	Parallel interface
	CN2	36	Type B interface (Optional)
	CN3	10	DC input, Power on/off signals
	CN4	2	Home Position (HP) sensor
	CN5	3	Rear Page End (PE) sensor
	CN6	2	Front PE sensor
	CN7	16	Printhead, thermistor
	CN8	4	Paper Feed (PF) motor
	CN9	5	Carriage Return (CR) motor
	CN10	2	Release lever position sensor
	CN11	2	Paper Guide (PG) sensor
	CN12	12	Control panel
C229 PSB/PSE/PSH Board Assembly	CN1	2	AC line input
	CN2	10	DC output, Power on/off signals

Table A-2. Connector Pin Assignments-CN1

Pin	I/O	Signal	Function
1	In	/STROBE	Strobe pulse. Input data is latched at the falling edge of the signal.
2 to 9	In	DATA 1 to DATA 8	Parallel input data to the printer.
10	Out	/ACKNLG	Pulse signaling that the printer has received data and is ready to accept more data.
11	Out	BUSY	HIGH signal indicates that the printer is not ready to accept data.
12	Out	PE	HIGH signal indicates that the printer is out of paper.
13	Out	SLCT	Always HIGH when the printer is powered on.
14	In	/AFXT	Not used.
15	—	NC	Not connected.
16	—	GND	Signal ground.
17	—	Chassis	Chassis ground.
18	Out	Logic H	This line is pulled up to +5 V through 3.9K Ω.

Table A-3. Connector Pin Assignments-CN1 (continued)

Pin	I/O	Signal	Function
19 to 30	—	GND	Signal ground.
31	In	/INIT	Initializes the printer.
32	Out	/ERROR	Indicates an error condition.
33	—	GND	Signal ground.
34	—	NC	Not connected.
35	Out	+5 V	This line is pulled up to +5 V through 1.0K Ω.
36	Out	/SLIN	Always HIGH when the printer is powered on.

Table A-4. Connector Pin Assignments-CN2

Pin	I/O	Signal	Function
1 to 6	—	+5	+5 VDC line
7	Out	TXD	Transmit data
8	Out	/READY	Ready to receive data
9	In	RXD	Receiving data
10	—	NC	No connected
11	Out	/RST	Reset
12	Out	INH	Inhibit
13	In	/CMREQ	Command request
14	In	/WRRDY	Write ready
15	In	/RDRDY	Read request
16	Out	/WR	Write
17	Out	/RD	Read
18	Out	/CS	Chip select
19 to 24	—	GND	Ground
25	Out	A3	Address bus bit 3
26	Out	A2	Address bus bit 2
27	Out	A1	Address bus bit 1
28	Out	A0	Address bus bit 0
29	In/Out	D7	Data bus bit 7
30	In/Out	D6	Data bus bit 6
31	In/Out	D5	Data bus bit 5
32	In/Out	D4	Data bus bit 4

Table A-5. Connector Pin Assignments-CN2 (continued)

Pin	I/O	Signal	Function
33	In/Out	D3	Data bus bit 3
34	In/Out	D2	Data bus bit 2
35	In/Out	D1	Data bus bit 1
36	In/Out	D0	Data bus bit 0

Table A-6. Connector Pin Assignments-CN3

Pin	I/O	Signal	Function
1	Out	PSC	Power Signal Control
2	In	PWDN	Power down
3 to 4	—	+5 V	+ 5 VDC line
5 to 6	—	GND	Ground
7	—	+35 V	+35 VDC line
8	—	+35 V	+35 VDC line
9 to 10	—	GP	Ground

Table A-7. Connector Pin Assignments-CN4

Pin	I/O	Signal	Function
1	In	HP	Home position sensor signal
2	—	GND	Ground

Table A-8. Connector Pin Assignments-CN5

Pin	I/O	Signal	Function
1	—	+5 V	+5 VDC line
2	In	PE	Rear PE sensor signal
3	—	GND	Ground

Table A-9. Connect Pin Assignments-CN6

Pin	I/O	Signal	Function
1	In	PE	Front PE sensor signal
2	—	GND	Ground

Table A-10. Connector Pin Assignments-CN7

Pin	I/O	Signal	Function
1	—	+5 V	+5 VDC line
2	In	HTMP	Head temperature signal
3	Out	HEAD3	Head Data 3
4	Out	HEAD1	Head Data 1
5	Out	HEAD5	Head Data 5
6	Out	C5	Head Drive Common 3 and 7
7	Out	HEAD7	Head Data 7
8	Out	C4	Head Drive Common 5 and 9
9	Out	HEAD9	Head Data 9
10	Out	HEAD8	Head Data 8
11	Out	HEAD4	Head Data 4
12	Out	C3	Head Drive Common 3
13	Out	C2	Head Drive Common 8
14	Out	HEAD6	Head Data 6
15	Out	C1	Head Drive Common 1 and 4
16	Out	HEAD2	Head Data 2

Table A-11. Connector Pin Assignments-CN8

Pin	I/O	Signal	Function
1	Out	PFA	PF Motor Phase A
2	Out	PF-A	PF Motor Phase $\overline{A}$
3	Out	PFB	PF Motor Phase B
4	Out	PF-B	PF Motor Phase $\overline{B}$

Table A-12. Connector Pin Assignments-CN9

Pin	I/O	Signal	Function
1	Out	CRA	CR Motor Phase A
2	Out	CR-A	CR Motor Phase $\overline{A}$
3	Out	CRB	CR Motor Phase B
4	Out	CR-B	CR Motor Phase $\overline{B}$
5	—	+35 V	CR Motor Common

Table A-13. Connector Pin Assignments-CN10

Pin	I/O	Signal	Function
1	In	RELEASE	Release sensor signal
2	—	GND	Ground

Table A-14. Connector Pin Assignments-CN11

Pin	I/O	Signal	Function
1	In	PG1	PG sensor signal
2	—	GND	Ground

Table A-15. Connector Pin Assignments-CN12

Pin	I/O	Signal	Function
1	—	+5 V	+5 VDC line
2	Out	POUTL	Paper Out LED
3	Out	PAUSE	Pause LED
4	Out	TOFFL	Tear Off/Bin LED
5	Out	FONT2L	Font LED
6	Out	FONT1L	Font LED
7	In	FONTSW	Font button
8	In	LFFFSW	FF/LF button
9	In	LDEJSW	Load/Eject button
10	In	PAUSESW	Pause button
11	In	PSC	Power switch control signal
12	—	GND	Ground

Component Layout

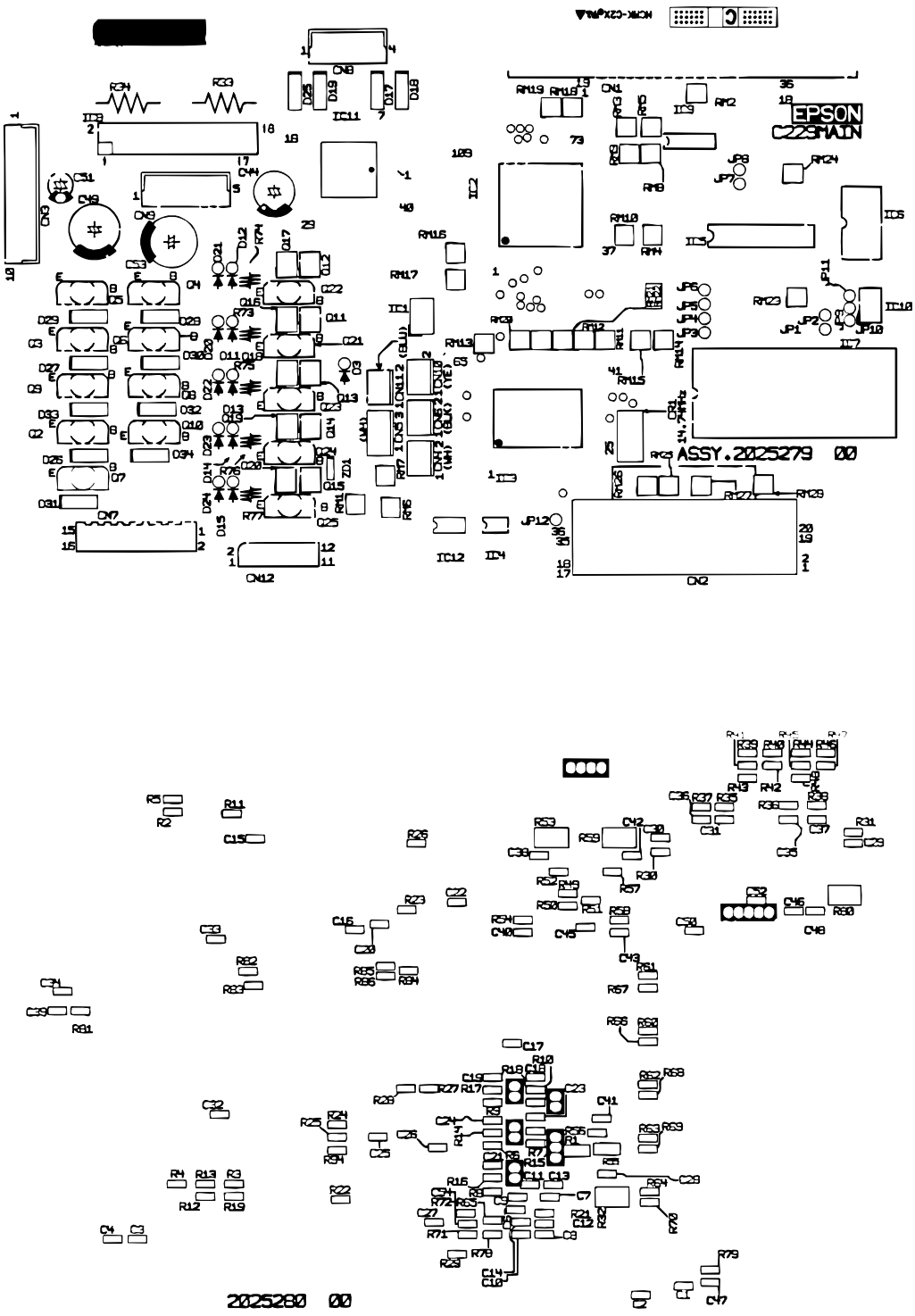


Figure A-2. C229 MAIN Board Component Layout

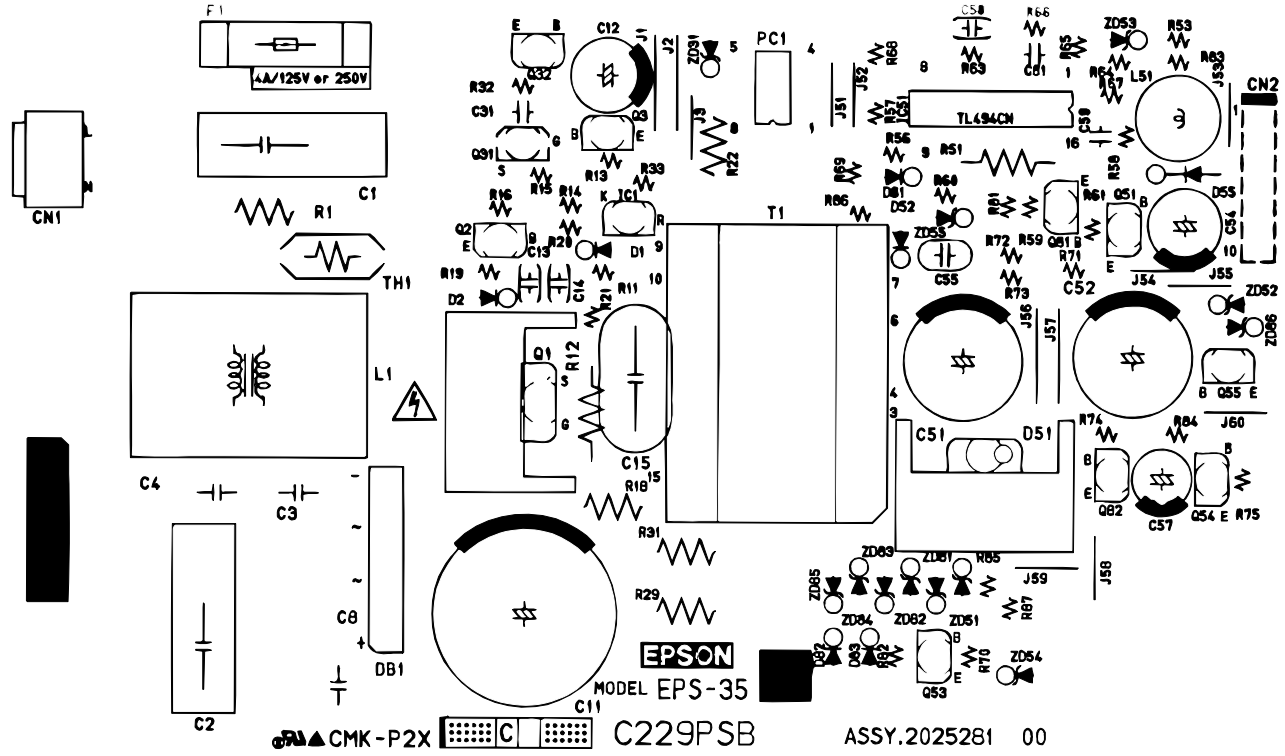


Figure A-3. C229 PSB Board Component Layout

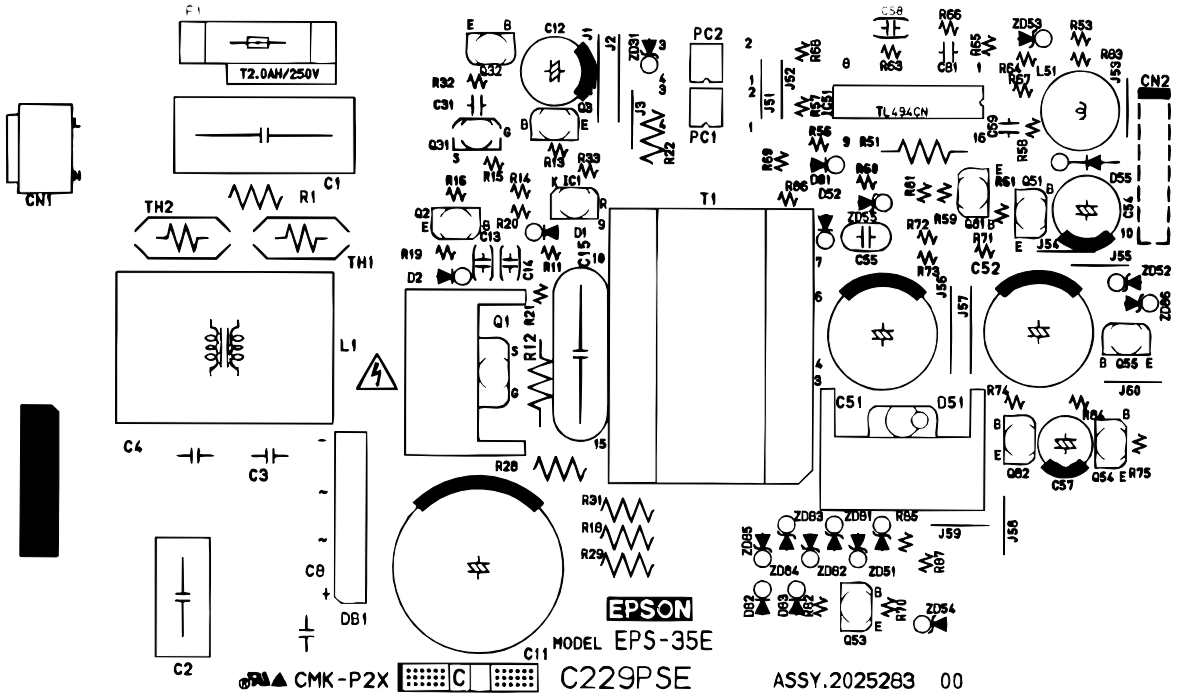


Figure A-4. C229 PSE Board Component Layout

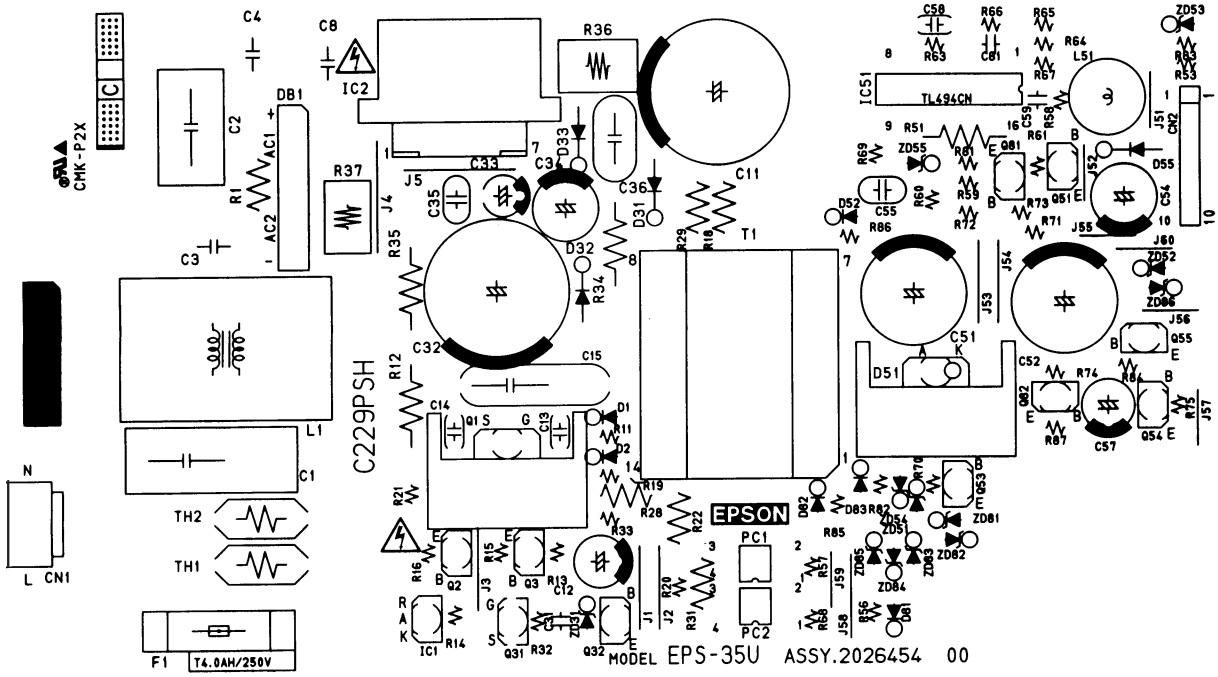


Figure A-5. C229PSH Component Layout

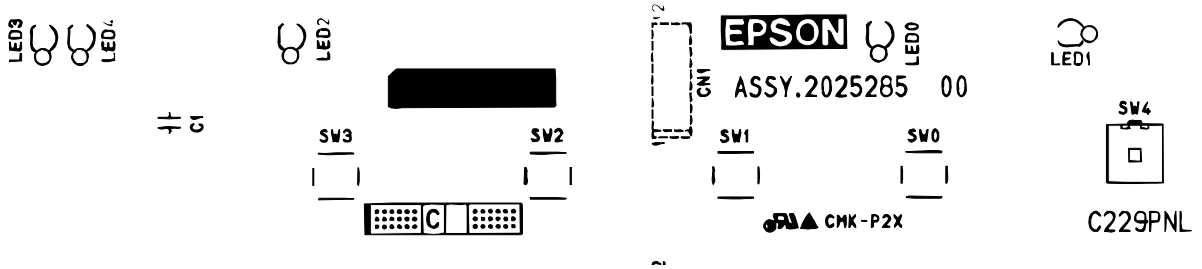


Figure A-6. PNL Board Component Layout

Dimensions and Weight

FX-1180

Dimensions: W 23.2 inches (590mm) × D 13.8 inches (350mm) × H 6.1 inches (154mm)
Weight: 21.2 lbs. (9.6 kg)

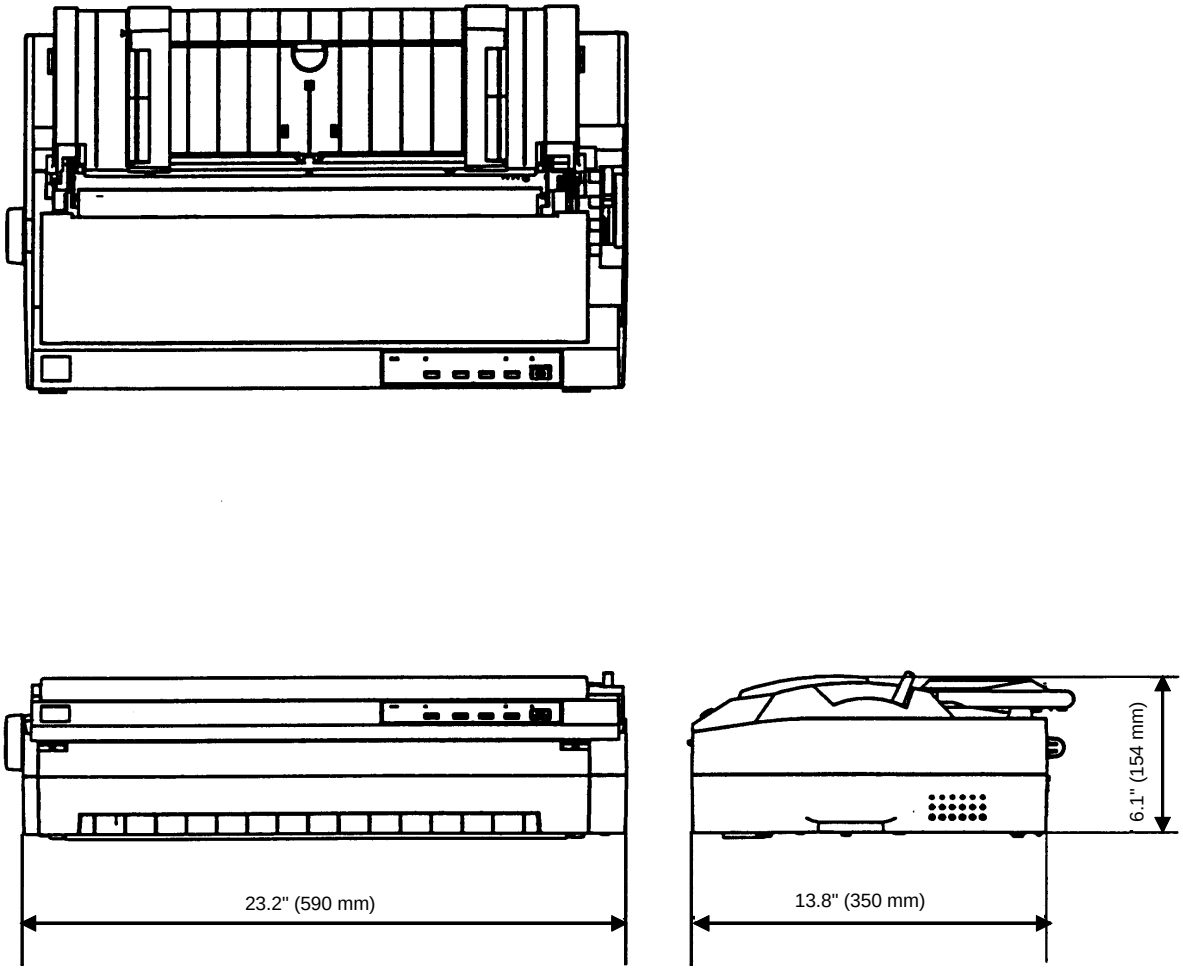


Figure A-11. Physical Specifications for FX-1180

FX-880

Dimensions: W 16.3 inches (415mm) × D 13.8 inches (350mm) × H 6.1 inches (154mm)
Weight: 16.8 lbs. (7.6 kg)

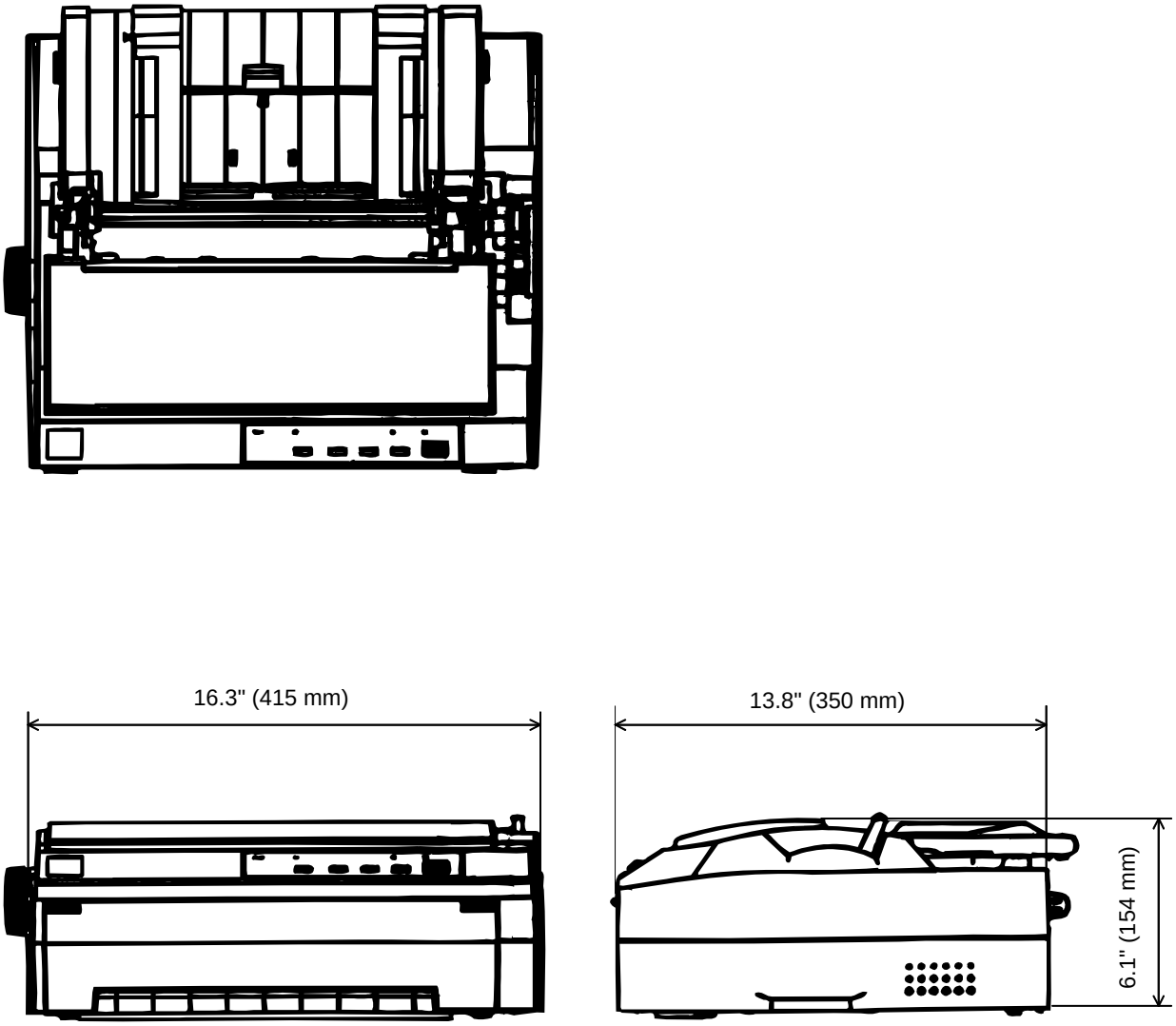


Figure A-12. Physical Specification for FX-880

Circuit Diagrams

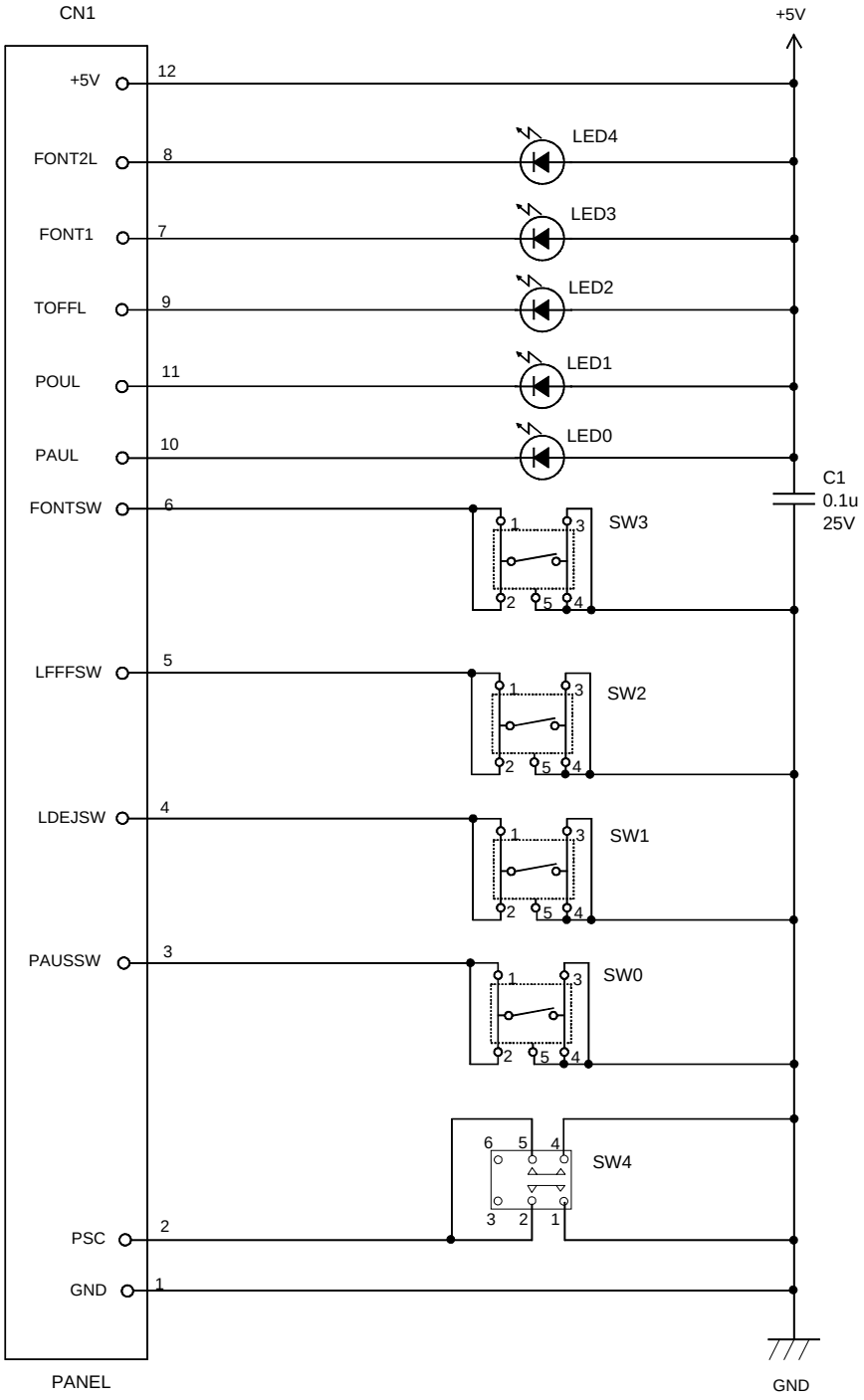
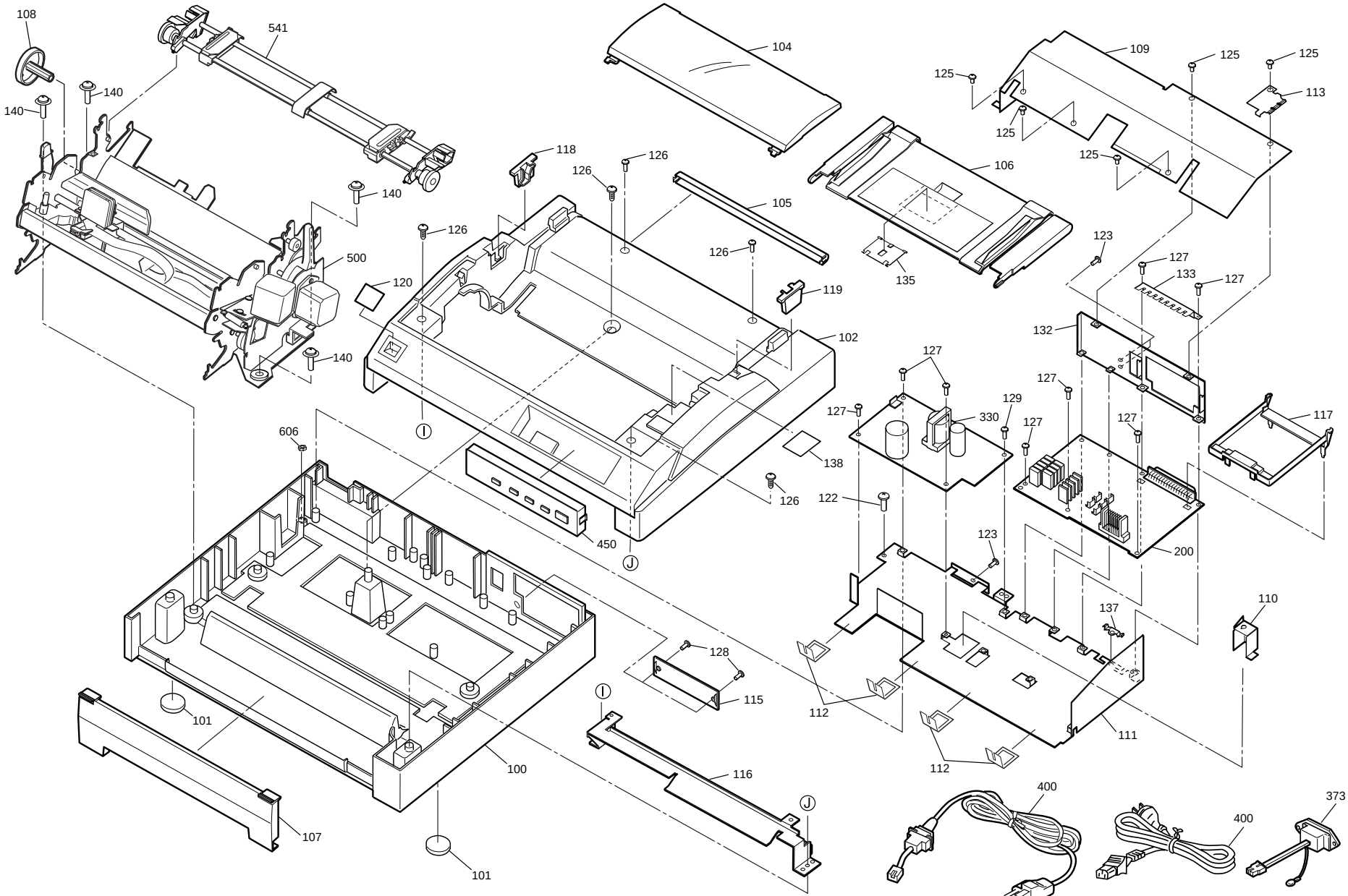
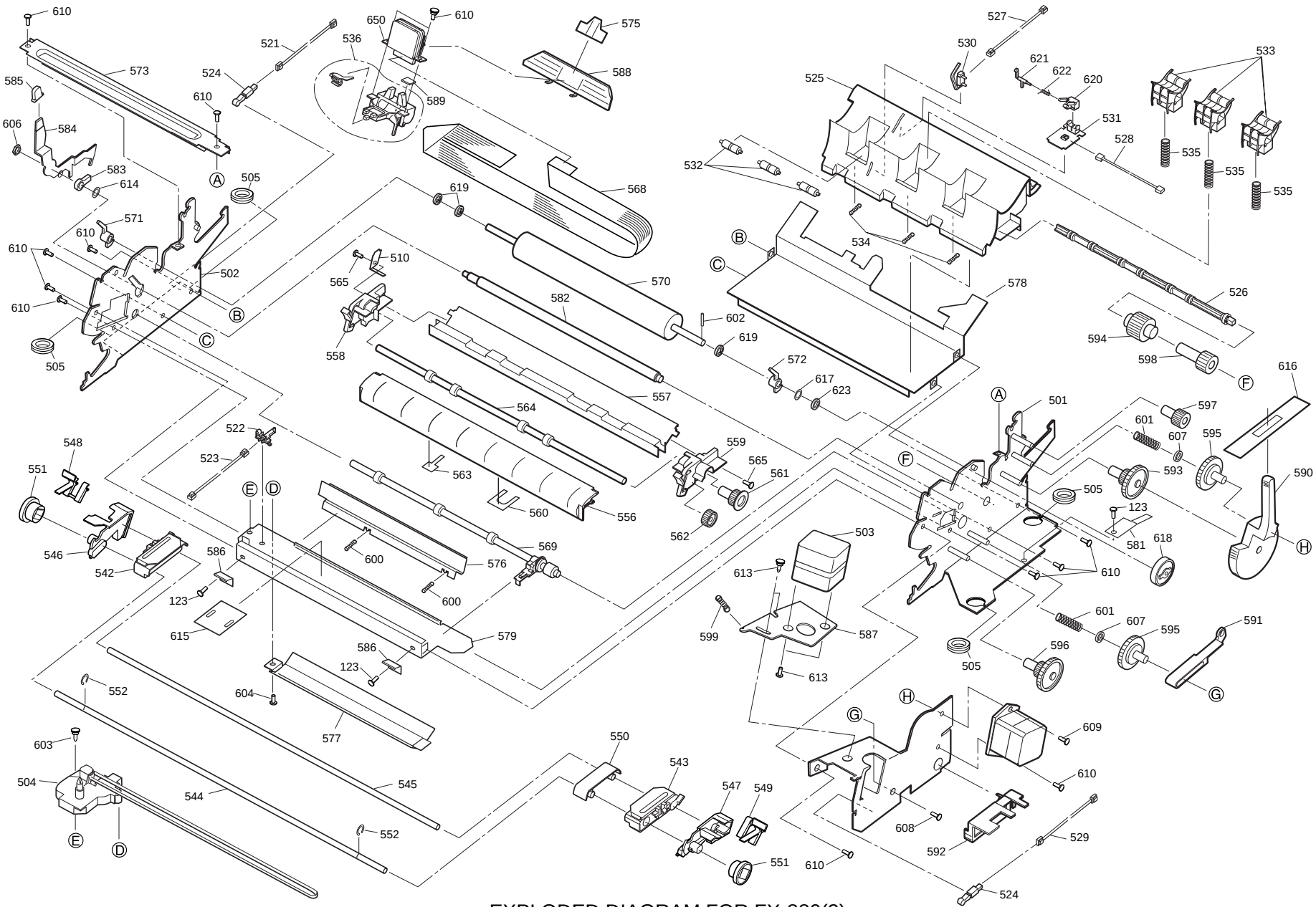


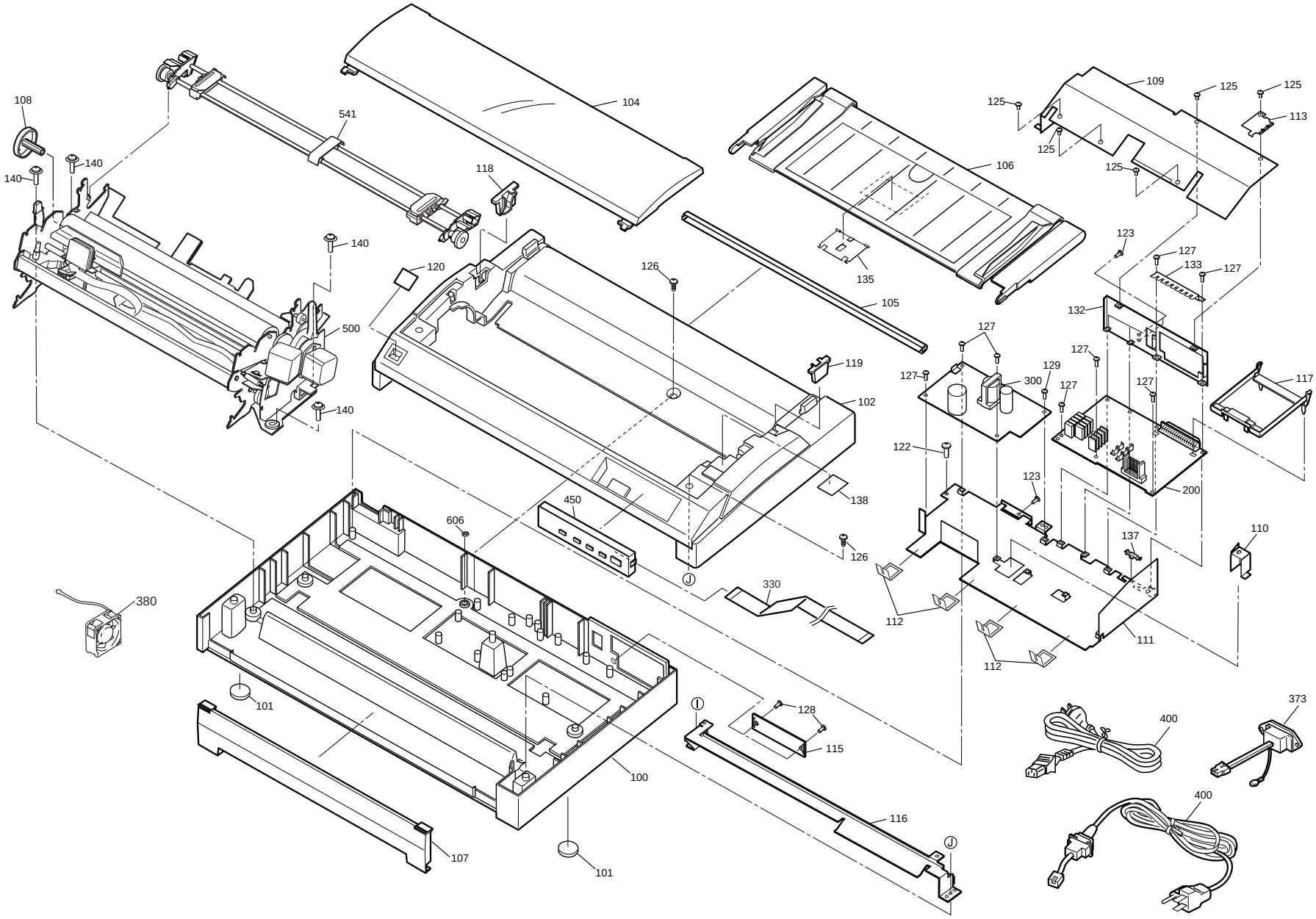
Figure A-13. PNL Circuit Diagram



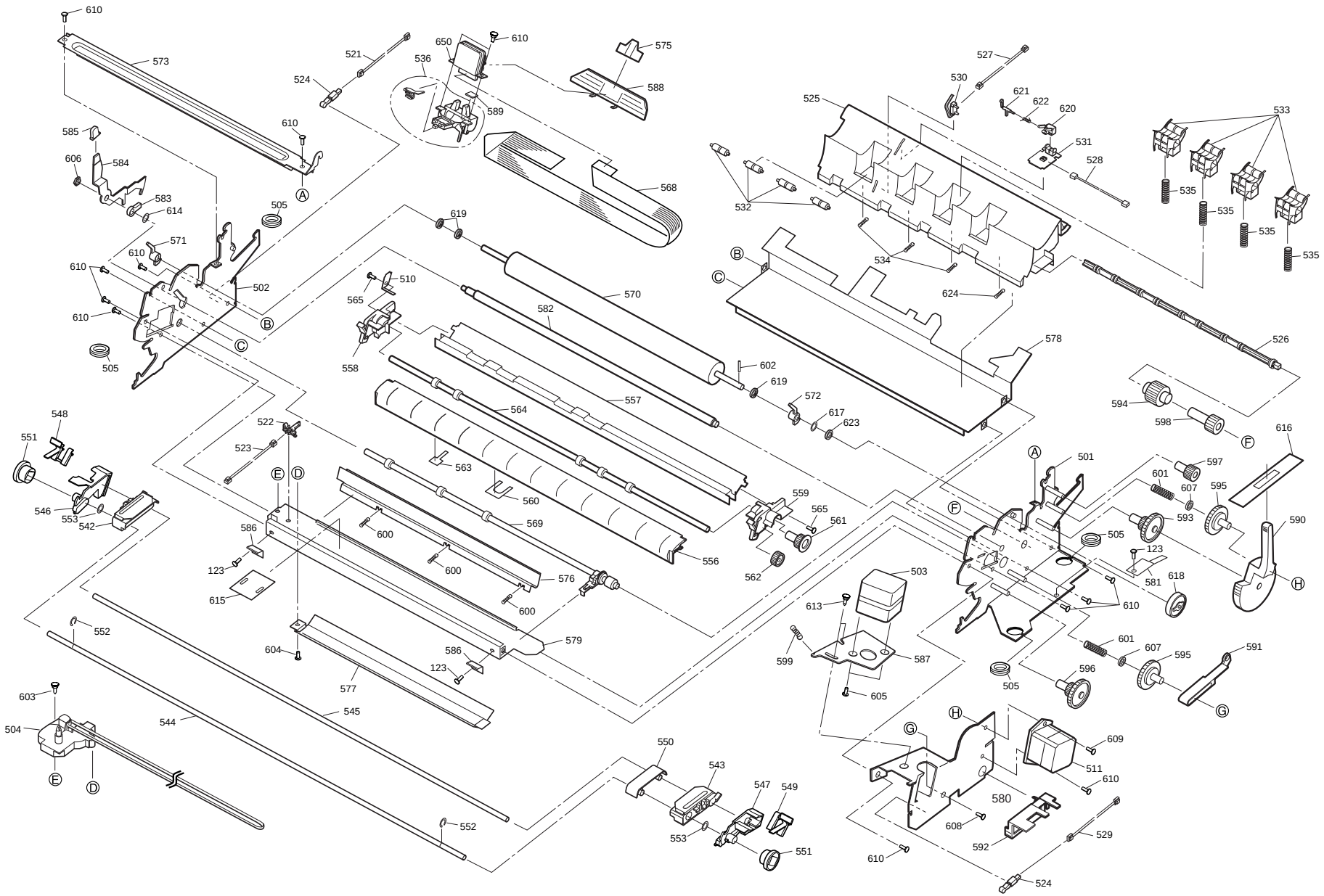
EXPLODED DIAGRAM FOR FX-880(1)



EXPLODED DIAGRAM FOR FX-880(2)

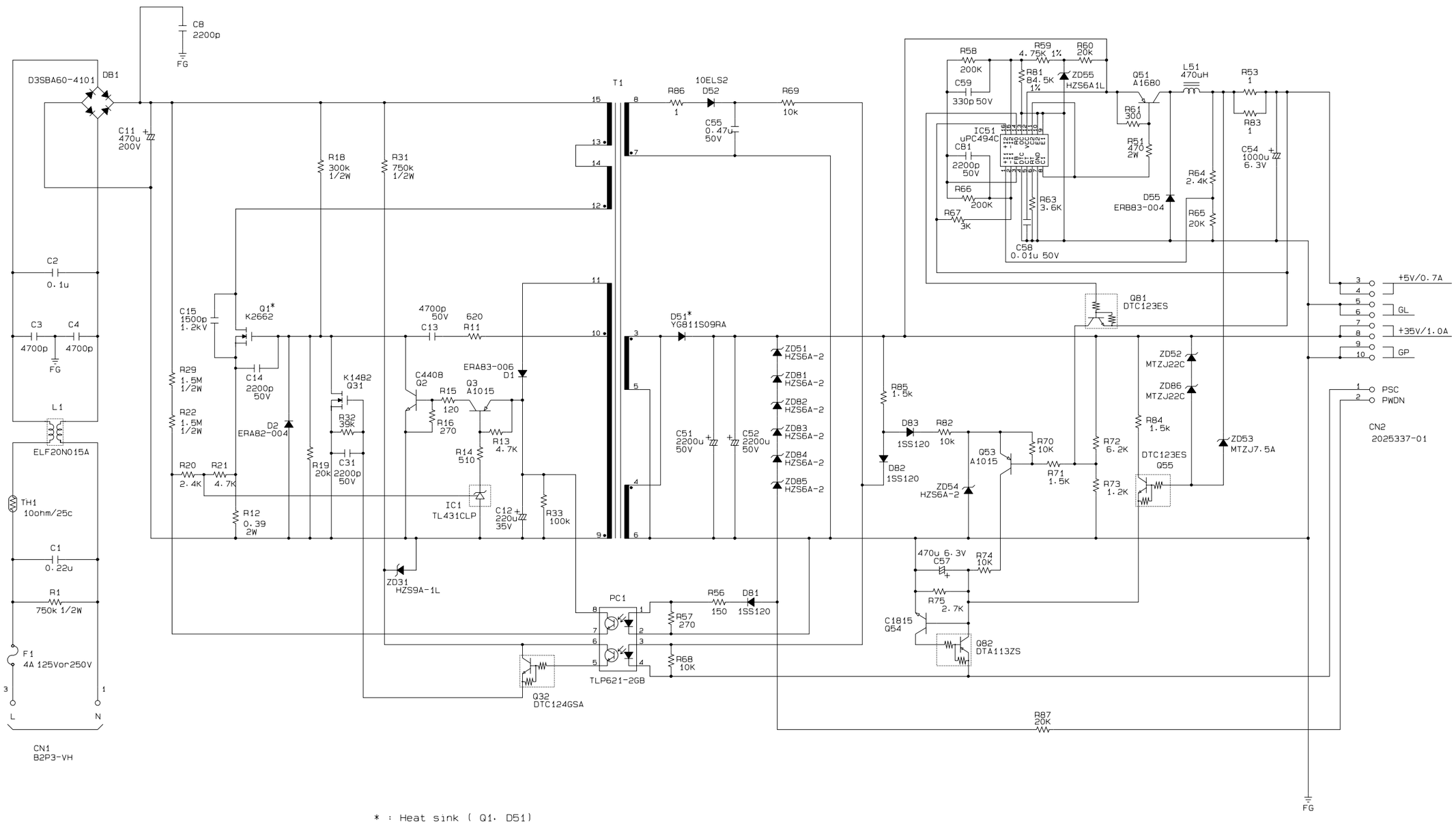


EXPLODED DIAGRAM FOR FX-1180(1)



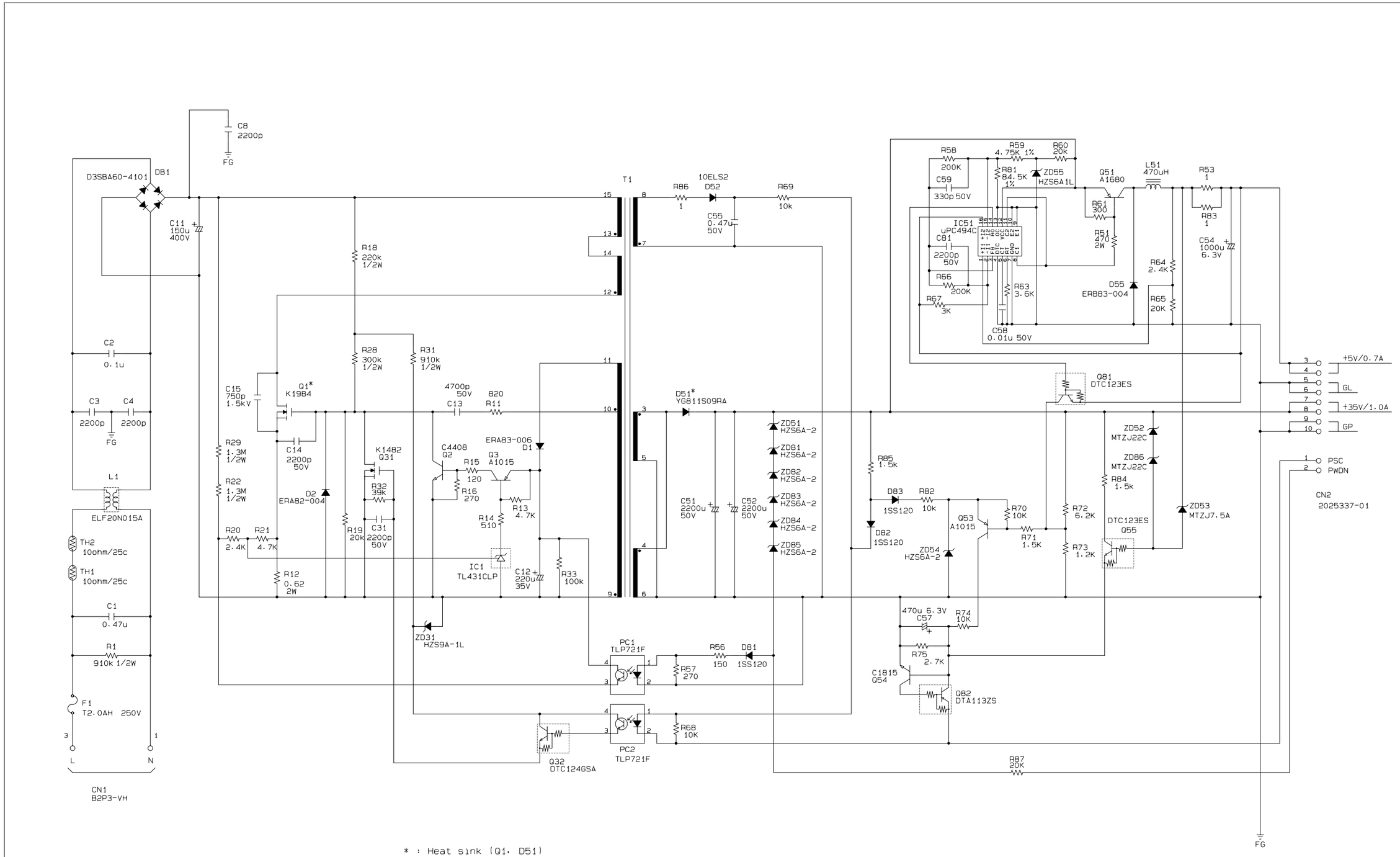
EXPLODED DIAGRAM FOR FX-1180(2)

CN12
PANEL
CN1
PARALLEL I/F
CN2
TYPE-B I/F
CN6
PE(FRONT)
CN5
PE(REAR)
CN4
HP
CN10
RELEASE
CN11
PG
IC2 E05B50YA
IC3 TMP96C141AF
IC1 PST594E
IC4 AT93C46
IC5 PSRAM1/4M
IC6 FLASH2/4M(TSOP)
IC7 EPROM2/4M MASKROM
IC8 BA7024M
IC9 74LS06
IC10 PST592D
IC11 AS017SEB
IC12 NJM2903M
CN7
HEAD
CN3
POWER
CN8
PF MOTOR
CN9
CR MOTOR
Not mounted
Not mounted
* : Heat sink (Q2 - Q10)
Model : FX-1180/FX-880
Board : C229MAIN BOARD
Sheet : 1 of 1
Rev. : C



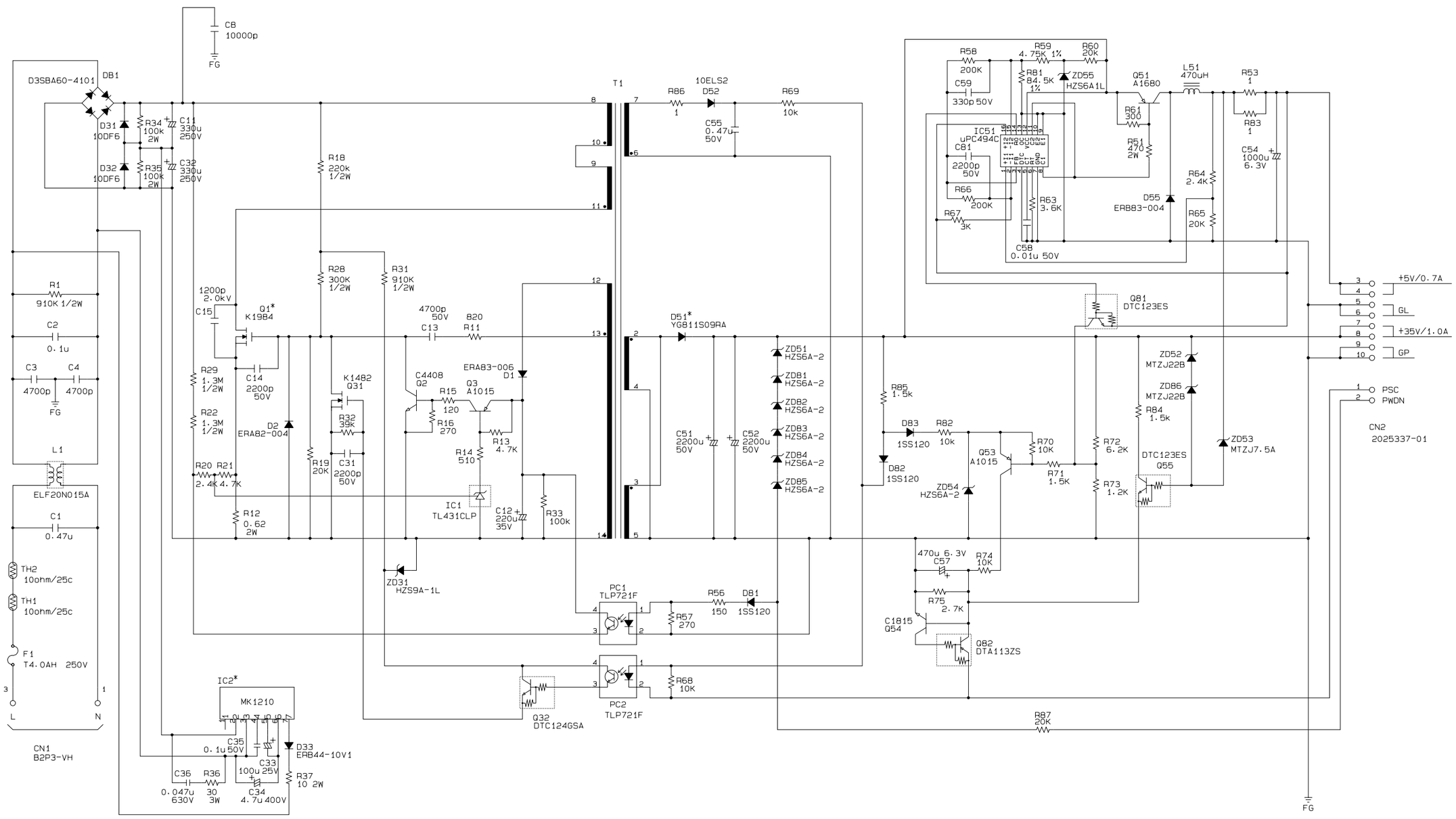
* : Heat sink (Q1. D51)

Model : FX-1180 / FX-880
Board : C229PSB BOARD
Sheet : 1 of 1
Rev. : A



* : Heat sink (Q1, D51)

Model : FX-1180 / FX-880
Board : C229PSE BOARD
Sheet : 1 of 1
Rev. : A



* : Heat sink (Q1. D51. IC2)

Model : FX-1180 / FX-880
Board : C229PSH BOARD
Sheet : 1 of 1
Rev. : B